# The Wasp Genus Gastrosericus Spinola, 1839 <br> (Hymenoptera: Sphecidae) 

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Cover Illustration: Gastrosericus attemutus, Turner, 1912, head of a male specimen ( $\times 34.4$ ). The hooked mandibles are unique for Hymenoptera. 111ustration by Mary Ann Tenorio.
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Aastract: The entire genus Gastrosericus is revised for the first time, and 61 species are recognized. The revision includes redescription of the genus, a summary of known behavior as well as original observations, differential diagnoses and descriptions of all species, illustrations, geographic records, distribution maps, identification keys, and an analysis of phylogenetic relationships among the species. Numerous previously unnoticed characters are used in keys, diagnoses, species descriptions, and analyses. Twenty-seven species are new: ammochares (Mali), azyx (Sri Lanka), bambara (Senegal to Burkina Faso), baobabicus (Senegal to Burkina Faso), dentarus (Senegal to Togo), eremicus (Mali, Arabian Peninsula, Pakistan, India), eurypus (South Africa), fulani (Senegal to Togo), herero (Namibia), hombori (Mauritania, Mali), incisus (southern 1ndia, Sri Lanka), lepidus (Senegal, Mali), lucidus (Senegal to Burkina Faso), mirabilis (Namibia), nama (Namibia), pnepheros (Egypt, Sudan), praos (Congo), punctatus (Senegal to Ivory Coast and Togo), sabulosus (Nauritania, Senegal, Pakistan), sobrinus (Senegal to Congo Basin), synander (Senegal, Mali, Ivory Coast, Togo), thorh (Egypt, Sinai), truncarus (Senegal to Niger), tuberculatus (Namibia), xanthophilus (Namibia, South Africa), zoyphion (Madagascar), and $z y$ (Zambia). Gostrosericus braunsi var. unicolor Arnold, 1929, is raised to full species status, and the following are new synonyms (valid names listed last): Gastrosericus laticeps Arnold, 1922 = braunsi Arnold, 1922; flavicornis Gussakovskij, 1931 = electus Nurse, 1903; eremorum de Beaumont, 1955 = funereus Gussakovskij, 193I; silverlocki Turner, 1912, and bidenfatus Arnold, 1922 = lamellatus Turner, 1912; oraniensis Brauns, 1906, and divergens Arnold, 1922 = karooensis Brauns, 1906; neavei reversus Arnold, $1951=$ neavei Turner, 1913; menoni Sudheendrakumar and Narendran, 1985 = siamensis Tsuneki, 1974; decipiens Arnold, 1955 = simplex Arnold, 1922; aiunensis Giner Mari, 1945 and Dinerus niger Dufour, 1853 = waltlii Spinola, 1839.

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#### Abstract

Resume: Le gente Gastrosericus est rèvisé au niveau mondial. Les charactèristiques du genre et celles des 61 espèces qu’il comprend dèsormais sont données, avec des diagnoses differentielles et tables de dètermination originales, et une analyse des relations phyletiques entre espèces. Cette révision, en partie basée sur des caractères morphologiques inédits, est complétee par des illustrations et des cartes de distribution géographique. Le comportement des espèces, en particulier celui associè à la sélection des proies et à la nidification, est discuté avec apport d’observations originales. Ving sept espèces nouvelles sont decrites: ammochares (Mali), azyx (Sri Lanka), bambara (du Sénégal au Bourkina Faso), baobabicus (du Senégal au Bourkina Faso), dentafus (du Sénégal au Togo), eremicus (Mali, Arabie, Pakistan, lnde), eurypus (Afrique du Sud), fulani (du Sénégal au Togo), herero (Namibie), hombori (Mauritanie, Mali), incisus (Inde méridionale et Sri Lanka), lepidus (Sénegal et Mali), lucidus (du Sénégal au Bourkina Faso), mirabilis (Namibie), nama (Namibie), pnepheros (Ėgypte et Soudan), praos (Congo), punctatus (du Sénégal à la Côte d'Ivoire et au Togo), sabulosus (Mauritanie, Sénégal, Pakistan), sobrinus (du Sénègal au bassin du Congo), synander (Sénégal, Mali, Côte d’lvoire et Togo), thoth (Egypte et Sinai), truncatus (du Sénégal au Niger), tuberculatus (Namibie), xanthophilus (Afrique du Sud, Namibie), zoyphion (Madagascar) et zyx (Zambie). Le Gastrosericus braunsi var. unicolor Arnold, 1929, est élevé au rang d'espèce. Les synonymies suivantes sont ètablies, le nom valide ètant énuméré le dernier: Gastrosericus laticeps Arnold, $1922=$ braunsi Arnold, 1922; flavicornis Gussakovskij, $1931=$ electus Nurse, 1903 ; eremorum de Beaumont, 1955 = funereus Gussakovskij, 1931; silverlacki Turner, 1912, et bidentatus Arnold, 1922 = lamellatus Turner, 1912; oraniensis Brauns, 1906, et divergens Arnold, 1922 = karooensis Brauns, 1906; neavei reversus Arnold, 1951 = neavei Turner, 1913; menoni Sudheendrakumar et Narendran, 1985 = siamensis Tsuneki, 1974; decipiens Arnold, 1955 = simplex Arnold, 1922; aiunensis Giner Mari, 1945, et Dinetus niger Dufour. $1853=$ walthi Spinola, 1839.


## Introduction

General.-Gastrosericus, an Old World genus of sphecid wasps, has received little attention in spite of intriguing morphological and biological diversity of its species. Past revisions were only regional: Arnold (1922) studied the Afrotropical species. Gussakovskij (1931) the Transcaspian taxa, and Krombein and Pulawski (1986) the Sri Lankan species. The overall knowledge of the genus, however, was still quite poor. Some species could not be recognized because of inadequate original descriptions and lack of subsequent studies. and many others were undescribed or known from one sex only. Excellent diagnostic characters were ignored, life histories unknown for the vast majority of species, geographic ranges of species known only approximately, and the species relationships unclear. Some species received several names because of sexual dimorphism, allometric growth, or extensive geographic ranges, resulting in considerable new synonymy. This study is the first revision of the entire genus. Sixty-one species are recognized, 27 of which are new. Although 12 names are new synonyms, the new species account for the net increase over the 42 species listed by Bohart and Menke (1976).

This study was submitted for publication in 1992, but new data were added through June 1995.

Technical Terms. - I use Bohart and Menke's (1976) morphological terms for most structures, although a few terms not included in their book are defined below and a few others are
redefined for clarity or convenience. I follow Michener and Fraser (1978) in their mandibular terminology with some modifications (Pulawski, 1991, 1992); new terms have been added to describe structures not found in the bees and thus not considered by these authors. A glossary including all mandibular and some other terms is provided below:

Clypeus (Fig. 1): the clypeus has a middle section and two lateral sections. The projecting anterior (or ventral) part of the middle section is referred to as the lobe (the lobe is subdivided in some species, e.g., it has a mesal projection flanked by two emarginations). An impunctate lip is found along the free margin of the lobe in some species.
Disk: central part of a sclerite, e.g., clypeal disk, scutal disk.
Humeral plate: a sclerotized plate located basad of the origin of the costal and subcostal veins of the forewing and partly covered by the tegula.
Interstitial: the recurrent veins are interstitial when they meet at one point on a longitudinal vein.
Mandible (Fig. 2):

- abductor ridge: this newly coined term designates a small ridge extending from the abductor swelling to the angular apex of the condylar ridge;
- abductor swelling: small bulge on the outer side of the mandibular base, next to condyle; insertion of the abductor muscle;
- acetabulum: mandibular articulation next to clypeus:

- adductor interspace: an area on the inner mandibular face, between the adductor ridge and the inner margin;
- adductor ridge: extends distad from the mandibular base on its inner side, adjacent to oral fossa and, in most sphecids, gradually becomes visible from the outside, constituting the distal part of the mandibular posterior margin. This ridge is often differentiated into a lower basal portion and a higher distal portion; when so, the two portions meet at an angle, or slightly overlap, or are separated by a gap; in species with notched mandibles, the distal portion delimits the notch from its distal side;
- basal width: distance between acetabular and condylar ridges measured next to acetabulum and condyle;
- cleft: in most Larrinae, the inner margin has a narrow incision. or cleft; in most genera, the cleft separates two expansions. the proximal and distal teeth;
- condylar ridge: arises from the condyle, extends distad, and forms the basal portion of the posterior mandibular margin; it is angulate distally in many Larrinae (including most Gas(rosertcus):
- condyle: mandibular articulation on the occipital side of the head capsule;
- inner margin: starts near acetabulum and is the cutting edge of the mandible; called upper edge by Michener and Fraser (1978):
- notch: an emargination on the posterior margin, delimited basally by the condylar ridge and distally by the expanded portion of the adductor ridge;
- posterior margin: extends between the condyle and mandibular apex; called externoventral margin by Bohart and Menke (1976) and lower margin by Michener and Fraser (1978); it


Figure 2. Mandible of Gistroserfius: $a$, outer view, $b$, antenor view.
actually consists of two components: the condylar ridge basally and the adductor ridge distally; the term posterior is preferred because the head is hypognathous and this edge is thus oriented posterad (Pulawski, 1991); Eickwort (1969) obviously accepted the same orientation when he spoke of the mandibular anterior edge (he did not discuss the posterior edge).

- preapical tooth: is placed on inner mandibular margin; normally absent in Larrinae, but present in females of some Gastrosericus; the name pollex (= thumb), proposed by Michener and Fraser (1978) for this structure, is not used here because of its etymological inadequacy.
Postspiracular carina: arcuate carina on anterodorsal part of mesopleuron, posterior to pronotal lobe, and delimiting the anterior end of subalar fossa.


## Pronotum:

- collar: the transversely elevated posterior part of pronotum, adjacent to scutum;
- precollar: the area situated between the collar and the anterior pronotal margin.
Scutal flange (Menke, 1988): the reflexed upward, impunctate and glabrous portion of the scutal lateral margin, extending between the tegula foremargin and the scutellum foremargin. In Gastrosericus, the flange is either evenly curved (Fig. 3a) or expanding over the tegula and contrastingly concave between expansion and the scutal hindcorner (Fig. 3b).
Scutum: shortened term for mesothoracic scutum.
Simple: without any specialized structure, e.g., coxa simple (without carinae, teeth, or concavities), gena simple (without teeth).
Sternum, tergum: shortened terms for gastral sternum, gastral tergum.

Geographic Names and Locality Records. - I have tried to use current official names of countries, provinces, and localities. The only exception is the informal name Transcaspia (frequently found in older entomological literature), used here to designate collectively the republics of Kyrghyzstan, Tajikistan, Turkmenistan, and Uzbekistan. The territory was known as Russian Turkestan prior to the 1920 s, and then as Soviet Middle Asia until 1991.

The country and locality names currently in use are often


Figure 3. Lateral portion of scutum and tegula: a. Gastroserters rotheyz, male ( $\times 156$ ) and b, Gastrosentus truncultus, male $(\times 215)$.
different from the names given in the literature or on specimen labels. A comparative list is given below for convenience:
Albertville, Zaire: now Kalemié
Deesa, India: present alternative spelling is Disa
Djerba, Tunisia: alternative spelling is Jerba
Fort Dauphin, Madagascar: now Taolanaro
Gold Coast: now Ghana
Hara Hoto, China: now Hei-Ch'eng
Katamia, Egypt: alternative spellings are Katania, Katana, or
Qattania
Kom Osheim, Egypt: alternative spellings are Kom Oshim,
Kom Awshim or Kom Ouchim
Lourenço Marques, Mozambique: now Maputo
Lyallpur, Pakistan: now Faisalabad
Macina, French Sudan: now Massina, Mali
Majunga, Madagascar: now Mahajanga
Matopos, Zimbabwe: now Matobo
Moçâmedes, Angola: now Namibe
Némours, Algeria: now Ghazaouet
Nyasaland: now Malawi
Phetchaburi, Thailand: alternative spelling is Phet Buri
Pontéba, Algeria: now Oumm ed Drou
Poona, India: now spelled Pune
Salisbury, Zimbabwe: now Harare
Sanyati River, Zimbabwe: now Umniati
Southern Rhodesia: now Zimbabwe
South-West Africa: now Namibia
Tanjore, India: now Thanjavur
Tenasserim. Burma: now Taninthari
Tuléar, Madagascar: now Toliara
Upper Volta or Haute Volta: now Burkina Faso
Wankie, Zimbabwe: now Hwange
Watagouna, Mali (label spelling): Ouatagouna
All locality names listed under Records have been checked
apinst available maps and gazelters and then used to produce against available maps and gazetteers and then used to produce
the distribution maps. Numbers of specimens studied and their depositories are generally indicated for each locality, but cumulative data are given in some cases for waltlii because of the large number of specimens.

Origin of Material. - This revision is based on a study of 6516 specimens, of which I collected about 1860 in Egypt (1958, 1993). Ghana (1991). India (1989), Ivory Coast (1991), Madagascar (1994), Mali (1991), Mauritania (1993), Namibia (1990), Pakistan (1989), Senegal (1991), South Africa (1990), Thailand (1988, 1989), Togo (1991), Turkmenistan (1964), Zambia (1995), and Zimbabwe (1995). The others were sent by institutions and individuals. The following is a list of 58 collections from which material was borrowed or where type material is preserved (the abbreviations preceding the names are used in the text to designate these sources):

| AAM | Alberto and Alessandro Mochi, Rome, lealy (pers |
| :---: | :---: |
| AEI: | American Entomological Insutute, Ganesville, Flonda (late Henry k. Townes). |
| AMG | Alhany Museum, Grahamstown. South Afnca (Friednch W. Gess). |
| AMNH | American Museum of Natural History, New York, New York (Jerome G. Rozen, Jr., Marjone Favreau). |
| ANSP: | Academy of Natural Sciences of Philadelphia, Philadelphia, Pennsylvanta (Donald Azuma, Daniel Otte). |
| BMNH | British Museum (Natural History), current nonstatutory name: The Natural History Museum, London, Great Britain (Colin R. Vardy, Laraine Ficken). |
| CALICUT | University of Calıcut. Calicut, kerala, Indıa (T. C. Narendran). |
| CAS: | California Academy of Sciences, San Francisco. Cahforma (Wojclech J. Pulawski). |
| CGR | C. Giles Roche, London, Great Briain (personal collection). |
| CNC : | Canadian National Collection of Insects. Arachnids, and Nematodes. Biosystematic Research Inslitute. Ottawa, Ontario. Canada (Gary A. Gibson). |
| CU : | Cornell University, Department of Entomology, 1thaca, New York (E. Richard Hocbeke). |
| FB: | Franco Borgato, Nouakchott, Mauritana (personal collection). |
| FSAG: | Faculté des Sciences Agronomiques de Gembloux. Belgium (Jean Leclercq). |

Forida State Collection of Arthropods, Gainesville, Flonda (Lionel A. Stange, James R. Wiley).

HD:

LUW: Landbouwuniversitest Wageningen, Department of Entomology, Wagenngen, the Netherlands (K. W. Robert Zwart).
LEM. Lyman Entomologieal Museum and Research Laboratory, Macdonald College, McGill University, Ste. Anne de Bellevuc, Quebec, Canada (P. Michael Sanborne, Cha-Chı Hsıung).
MCZ: Museum of Comparatıve Zoology, Harvard Unıversity, Cambridge, Massachusetts (James MI Carpenter).
MHNG
MNHN
MRAC:
MS.
MT
MZL
NCIP
NMC
NHMW:
NHMZ.
OXFORD: Oxford University Museum, Hope Department of Entomology, Oxford, Great Britain.
PMA: Provincial Museum of Alberta, Edmonton, Alberta, Canada (Albert T. Finnamore).

PORTIC1. Jstıuto dı Entomologıa Agrana dell'Unıversıtà dı Napolı. Portıcı. Italy (Ermeneguldo Tremblay).
QA Quabır Argaman, Y'avne, lsrael (personal collection)
RMNH: Rijksmuseum van Natuurlijke Histone, Leiden, the Netherlands, including P. M F. Verhoeff and Raimond V. Hensen collections (Kees van Achterberg).
SAM. South African Museum, Cape Town, South Africa, including G Arnold collection, which was previously housed in Bulawayo, Zım. babwe (Vincent B. Whitehead).
SDNH Natural History Museum, San Diego, Calıforma (David K Faulkner).
SMNW: State Museum of Namıba. Windhoeh, Nambra (John Irish, Eugene Marans).
TMP: Transvaal Museum. Pretoria. South Afnca (Robert B. Toms).
TORINO. Istututo e Míseo dı Zoologia dell'Lnversità dı Torıno. Haly.
UCD University of Calıforma, Davis (Rıchard M Bohart, late Robert O. Schuster, Lynn S. Kimsey).
LISNM United States National Museum of Natural History, Smıthsonian Instıtution, Washington, D.C. (Karl V Kromben, Arnold S. Menke)
VLK Vladımır L Kazenas, Alma Ata. Karahhstan.
Wh. Walter Linsenmater, Ebikon, Swizerland (personal collection),
WS
ZIN
ZMA

ZMHT Zoologısches Museum an der Humboldt Unıversıtät, Berlın, Germany (Franh Koch).
ZMK Zoological Museum, Copenhagen, Denmark (Ole Lomholdt).

ZMMU
ZSBS
Zoological Museum, Moscow University, Moscow, Russia (Lena V. Zımina, Alexander V. Antropov).

Zoologrsche Sammlung des Bayenschen Staates, München, Germany (Ench Diller).

Collectors' Names. - For brevity's sake, collectors of specimens in type series of new species are abbreviated as follows:

AM: Alessandro Mochı
AP: Alain Pauly
GC: G. Couturier
JG: Joseph Gusenleitner
KVK: Karl V. Kromben
MS: Maxımılıan Schwarz
WJP: Wojcrech J. Pulawsk
Collector names mentioned once or a few times are not abbreviated.

## Genus Gastrosericus

Gastrosericus Spinola, 1839:480. Type species: Gastrosericus walthi Spinola, 1839, by monotypy. - As Gasterosericus (unjustified emendation or masspeling): Dahlbom, 1845:467, Brauns, 1906.49, 51, 52.
Epamatnstethus Kohl, 1907:167. Type species: Eparmatostethus madecassus Kohl, 1907, by monotypy. Synonymized with Gastrosericus by Arnold, 1927:116. As Eparmostethus (misspelling): Pate, 1937:26, Bohart and Menke, 1976:43.
Paralellopsts MaıdI, 1914147. Type species: Paralellopsis africana Madl, 1914 [ Gastrosericus neavel Tumer, 1913], by onginal designation and monotypy. Synonymized with Gastrosericus by Arnold, 1922:114. - As Parallelopsts (misspelling): Turner, 1916:258; Pate, 1937:47.
Dinetomorpha Pate, 1937:22. Article 13a (11) (as Dinetomorpha Gussakovskij, 1931, a subgenus of Gastrosericus). Type species: Gastrosencus flavicornis Gussakovskif, 1931 [= Gastrosertcus electus Nurse, 1903], destgnated by Pate, 1937: 22. Synonymized with Gastrosericus by Bohart and Menke, 1976:43.-Dmetomorpha Gussakovskij, 1931:451, unavatable name: type species not designated (Article 13b).
Gastrargyron Pate, 1937:28, Article 13a (11) (as Gastrargiron Gussakovskı, 1931. a subgenus of Gastrosericus). Type species: Gastrosericus marginalis Gussakovshy, 1931, designated by Pate, 1937:22. Synonymized with Gastrosericus by Bohart and Menke, 1976:43-Gastrargmon Gussakovskij, 1931:451, unavalable name: type species not designated (Article 13b)

Diagnosis - Gastrosericus is a member of Larrini, as defined by Bohart and Menke (1976:226). Thus, the hindocellus is modified to a flat, elongate scar; a part of each scar is bordered by a narrow, translucent band, the only remnant of a lens (the band is broadly interrupted on the scar's outer, posterolateral, or lateral side, depending on its orientation). Unlike other genera of the tribe, Gastrosericus has two rather than three submarginal cells, an autapomorphy.

Bohart and Menke (1976:254) gave two other diagnostic features of Gastrosericus: an incomplete episternal sulcus and unique hindocellar scars (long, narrow, diverging at a flat angle of $130^{\circ}-$ $145^{\circ}$ ). In reality, an incomplete sulcus does not allow recognition since it is also found in Holotachysphex. Tachytella. many Paraptagetza. most Tachysphex, and in Kohhella anula Pulawski. The hindocellar character is also problematic. First. the angle of divergence is about $125^{\circ}$ in the male of $G$. stmplex (Fig. 110 g ), less than the $130^{\circ}$ of some Tachysphex: Second, the shape is almost identical in an undescribed species of Tachytella. and the angle of divergence is about $130^{\circ}$ in the female and about $145^{\circ}$ in the male (more than the $120^{\circ}$ shown in Bohart and Menke's Figure 61E for $T$ aureopilosa Brauns).
Description. - The genus was described in detail by Bohart and Menke (1976) who sludied 18 species. I redescribe it here taking into account 60 species examined (1 have not seen mon-
golicus) and several features not known to these authors. Bohart and Menke stated that the "malar space [is] developed in some males", but except for a narrow one in lamellatus this feature is absent in Gastrosericus. Contrary to their description, the episternal sulcus varies in length, not always "ending just as it reaches venter of pleuron". In some species (e.g.. Iamellatus and siamensis) it extends onto the ventral surface. The major structural characters of Gastrosericus are the following:

Posterior mandibular margin variable: notched, stepped, or entire. Frons without oblong, glabrous tubercle above antennal socket, with no unusual swellings near midocellus or along orbit. Clypeus with mesal lobe, but lobe reduced in marginalis. Hindocellar scars long, narrow, diverging anterolaterad at a very flat angle ( $125^{\circ}-145^{\circ}$ ), shorter than distance that separates each scar from midocellus. Inner orbits convergent above in most species, parallel in some, and divergent above in rothneyi. Occipital carina, in most species, effaced before joining hypostomal carina, but joining hypostomal carina in attenuatus, lamellatus, praos, siamensis, and simplex. Episternal sulcus originating near middle of subalar fossa in some species and next to postspiracular carina in others (with many intermediates), ending (at varying distance) before reaching anteroventral margin of pleuron. Propodeal dorsum setose. No sclerites ("propodeal sternum" of Menke) between the mctasternal apex and propodeum (behind hindcoxa). Marginal cell of forewing long to markedly shortened (costal margin 0.8-6.0 $\times$ apical truncation); two submarginal cells present; jugal lobe of hindwing extending beyond crossvein cu-a in most species, but ending at level of cu-a in several, and ending before cu-a in some (e.g, braunsi, herero, pulchellus); in the latter case, the anal and jugal excisions are far apart, as in Tachytella. Forecoxa mostly without apical process (apical process present in female of unicolor and males of attenuatus and lamellatus). Hindtibia not ridged. Hindtarsomere II long ( $0.7-0.8 \times$ hindtarsomere I). Female foretarsus with rake; foretarsomere I without ventral spines; apicoventral margin of hindtarsomere $V$ straight or nearly so in most species, but arcuate in hombori and vedda (markedly so in hombori). Claws not dentate. Tergum I with well-defined lateral carina, without short, oblique ridge extending from each anterolateral corner (ridge present in Liris, for example). Tergum II without lateral carina. Female: tergum VI not flattened, angle between lateral margin of tergum and lateral margin of pygidial plate, in side view, about $30^{\circ}-40^{\circ}$; pygidial plate well defined except lateral carina evanescent in mirabilis, without preapical row of punctures; sting including sheaths slightly flattened dorsoventrally in cross section. Male: tergum VII without apical depression; male sterna with setose patches in some species, but patches absent in most; sternum VIII variable: apical margin round to emarginate; gonostyle setose ventrally; head of penis valve without teeth (Figs. 88d; 108f; 112b).

Additional characters that vary in related genera but which are uniform in Gastrosericus are: labrum flat (free margin entire or emarginate); foretibia setose throughout, outer face not spinose or occasionally with one spine near midlength; venter of female tarsomere $V$ with straight apical margin, male tergum VIl with pygidial plate delimited by lateral carinae.

Relationships to Other Genera.-Bohart and Menke's (1976) dendrogram of larrin genera indicated that Gastrosericus was the sister group of Holotachysphex + Kohliella + Parapi-
agetia + Prosopigastra + Tachysphex. Apparently the dendrogram was generated using the 50 larrin characters listed on page 224, but individual branches were not supported by specific character states, and plesiomorphies may have been used as well to support certain groupings. Cladistic relationships between genera have not been analyzed so far. Pulawski (1979), however, recognized additional apomorphies within the tribe and (1991) demonstrated that one apomorphy of Gastrosericus, the loss of the oblique basal carina on tergum 1, is shared with Holotachysphex, Kohliella, Parapiagetia. and Tachysphex. This carina is also absent in many Tachytes and in Larropsis chilopsidis (Cockerell and Fox), apparently a parallelism. It is present in the other Larrinae, including Prosopigastra, and in most other Sphecidae (obvious exceptions are Sphecinae and most Pemphredoninae, in which the gastral base is petiolate). One synapomorphy of Holotachysphex. Kohliella. Parapiagetia. and Tachysphex. a glabrous swelling above each antennal socket, is not found in Gastrosericus. The genus thus appears to be the sister group of the other four.

Character Polarities. - Since Gastrosericus appears to be the sister group of Holotachysphex + Kohliella + Parapiagetia + Tachysphex, these four genera have been used as the outgroup in establishing polarities of the transformation series. Because exact phylogenetic relationships among these genera are still unknown, the outgroup algorithm of Maddison, Donoghue, and Maddison (1984) was not used. Other Larrini, and in some cases other Sphecidae, were also considered. Behavioral data, available for only twelve species and mostly incomplete, were not used in the analysis. Character states that occur in both Gastrosericus and the outgroup are considered plesiomorphic. Character states that occur only in some Gastrosericus but not in the outgroup are considered apomorphic. Character states that are found in Gastrosericus and some members of the outgroup were not polarized, unless there is enough evidence that they were acquired independently. The character state coding is: 0 : ancestral, 1 and 2: derived. The following characters have been considered:

## A. Synapomorphies

1. Length of mandible: 0 , mandible not elongate (distance between acetabulum and apex at most $3.5 \times$ basal width); I, mandible elongate (distance between acetabulum and apex at least $4.5 \times$ basal width). The mandibles are moderately long in the outgroup and the other Larrinae, but elongate in Gastrosericus attenuatus and lamellatus (Figs. 12c; 13a, b; 60d, e: 6la, d; 62a, d), as well as the female of baobabicus (Fig. 20c). The elongate male mandible of Dalara mandibularis (Williams) is an obvious convergence.
2. Mandibular notch (Fig. 4): 0, notch present; 1 , notch absent. The correct interpretation of the mandibular notch as either ancestral or derived is crucial for classification of Larrinae. Bohart and Menke (1976:225) thought that the nonemarginate posterior margin of some Liris is derived because it is correlated with the presence of a pygidial plate in the male, an advanced character. Lomholdt (1985) commented equivocally that "in a very few larrine genera absence of this emargination is primary." Menke (1988) hypothesized that the emarginate mandible is plesiomorphic in Larrinac (including Crabroninae) as this in-
terpretation required fewer reversals. Pulawski’s (1992) analysis of various mandibular structures confirmed Menke's opinion. Clearly, the ancestral condition of Sphecidae is the entire mandible, with the condylar ridge not angulate distally, and the proximal portion of the adductor ridge not differentiated from the distal portion (this type, found in many relatively unspecialized Sphecidae such as Chalybion and Sphex, is shared with Pompilidae and bees). The mandible of most Larrini is obviously derived as compared with that of Sphex, having a notched posterior margin; the notch is delimited, on the basal side, by the angulate apex of the condylar ridge and, on the distal side, by the broadened distal portion of the adductor ridge. Within Larrini. however, the mandible is entire in Dalara, Gastrosericus marginalis and mongolicus, two Holotachusphex, some Liris (the aurulentus and melanius species groups), most Paraliris, in Tachusphex nefarius Pulawski, Tachutes chrisopyga (Spinola), and Tachytes dichrous F. Smith. These cases are obvious secondary simplification (I was unable to reexamine the holotype and the only known specimen of Tach wsphex nefarius). In Tachyes chrysopyga, for example, the notch is obscured because the broad distal portion of the adductor ridge extends under the condylar ridge (which is still angulate distally); yet the proximal and the distal portion of the ridge are clearly differentiated. In Liris aurulentus (Fabricius) and its relatives, the condylar ridge is almost not angulate distally, but it comes into direct contact with the adductor ridge, a unique and obviously derived situation, and the adductor ridge is clearly differentiated. In Hol otachysphex, the condylar ridge is either angulate (notch present) or not angulate apically (notch absent), but the adductor ridge is differentiated (the two portions differ in height and overlap slightly). In Gastroscricus marginalis, the condylar ridge is not angulate apically, but the adductor ridge is differentiated (basal portion evanescent, distal portion well-defined). 1 conclude that the notched mandible of Larrinae is the ancestral state for Gastrosericus and the entire mandible of marginalis is derived.
3. Condylar ridge: 0 , straight or slightly concave; 1 , convex (Fig. 69 e ). The convex ridge, found only in females of $G$. madecassus and zoyphion, is obviously derived.
4. Apex of condylar ridge: 0 , acutely angulate; 1 , obtusely angulate (Figs. 69e; 116e). The condylar ridge of most Larrini is acutely angulate apically (although the angle is frequently rounded). The other cases are reversals, as discussed under No. 2 above. Therefore, the obtusely angulate apex of Gastrosericus madecassus. swalei, and zoyphion is also derived.
5. Subbasal mandibular tooth of female: 0 , present; 1 , absent. Within the sister group of Gastrosericus, the tooth is absent in Paraplagetia. Tachusphex nefarius Pulawski, and Tachusphex rumses. Since the two latter species are members of specialized lineages, and since Paraptagetia, as a whole, appears to be more derived than Tachisphex, 1 accept the absence of the tooth in many Gastrosericus as an independently acquired specialization. The tooth may be well developed in most individuals of a species (e.g., in Gastrosericus fulani), but occasionally reduced in others, a fact that seems to corroborate the interpretation here accepted.
6. Mandibular cleft of female: 0 , narrow, acutely angulate; 1 , "ectangular, rounded, or absent (these three states, which appear to belong to a single transformation series, are difficult to delimit and are therefore regarded as one). The cleft is present and narrow in most Larrini (exceptions include Dalara, Paralirns. and Tuchytella), and many other Larrinac, c.g., in Palarini, less
spectalized Miscophini, and less specialized Trypoxylini such as Pison. Within the sister group of Gastrosericus, the cleft is absent in Holotachusphex (perhaps a reduction due to the twignesting habits), in Parapiagetia genicularis (F. Morawitz), Tach1sphex nefarius, and Tachysphex ramses (the latter two species are members of specialized lineages). In spite of these exceptions, I regard the rectangular, rounded, or absent cleft as apomorphic for Gastrosericus.
7. Preapical tooth of inner mandibular margin in female: 0 , tooth absent; 1, tooth present. The presence of a preapical tooth on the mandibular inner margin is an ancestral feature of Sphecidae (shared with Pompilidae), but the tooth is absent in Larrini as well as other Larrinae. The preapical mandibular tooth of Gastrosericus waltlii and some other species must therefore be a secondary specialization. An obtusely angulate preapical expansion in some fullani does not appear to be homologous.
8. Abductor ridge: 0 , absent; I, present. This ridge is absent in the outgroup and most other Larrinae, so its presence in some Gastrosericus is considered apomorphic. It is also present in some other specialized Larrini (e.g., Prosopigastra punctatissima A. Costa), some specialized Trypoxylini (Pisonopsis), and some Crabroninae (e.g., in Entomognathus), but these are considered to be independent derivations.
9. Labrum: 0 , free margin straight or minimally concave; 1 , free margin conspicuously emarginate. The free margin of the labrum varies in the outgroup: it is straight or minimally concave in Kohliella, unspecialized Tachysphex such as pompiliforms (Panzer), and many Parapiagetia such as genicularis ( F . Morawitz). It is emarginate in Holotachysphex, many Parapiagetia, and many Tachusphex, and 1 regard all these cases as independent specializations. In Holotachysphex and Parapiagetia. the emarginate labrum is correlated with a specialized clypeus, and in Tachysphex it occurs only in specialized lineages such as the obscuripennis and ervthropus species groups.
10. Occipital carina: 0 , joining hypostomal carina; 1 , effaced before reaching hypostomal carina. The occipital carina reaches the hypostomal carina in all outgroup taxa examined, so this state is inferred to be plesiomorphic for Gastrosericus (occipital and hypostomal carinae not separated in attenuatus, lamellatus, praos, siamensis, simplex, and $z 1 x$ ).
11. Genal tooth of female: 0 , absent; 1 , present. The gena is simple in the outgroup and other Larrini, but dentate in females of some Gastrosericus. The position of the tooth on the head varies slightly from species to species, but they all appear to be homologous. The additional (upper) teeth in Gastrosericus pulchellus and rothney differ markedly in their relative positions on the head and may not be homologous. Because their interpretation is uncertain, these additional teeth were excluded from the analysis.
12. Clypeal lobe of female: 0 , present; 1 , absent. The female of Gastrosericus marginalis (probably also that of mongolicus) is unique within the genus and the outgroup in lacking the clypeal lobe. The state 1 is thus clearly an apomorphy.
13. Clypeal lobe of female (corners): 0 , corner well-defined; 1 , comer ill-defined or reduced. The corners, found in the vast majority of Larrini, are absent in some specialized Parapiagetta such as richteri de Beaumont and some specialized Tachytes such as cameronianus Morice. Because none of these species are likely to share a unique common ancestor with Gastrosericus, the absence ol corners is inferred to be apomorphic in the genus.


Figure 4. Mandible: a, Tachypompilus unicolor (Banks), outer side ( $\times 46.0$ ); b, same, anterior side ( $\times 52.0$ ); c, same inner side ( $\times 52.0$ ); d, Gastrosericus rothneys. inner side ( $\times 97$ ); e, same central portion of inner side ( $\times 271$ ).

The corners are well-defined in most Gastrosericus, but ill-defined or totally reduced in some, e.g., capensis, lepidus, sabulosus, unicolor, and waltlii.
14. Free margin of female clypeus: 0 , without lateral emarginations and median projection; 1 , with a pair of emarginations that delimit a median, essentially rectangular projection (Figs.

8a, b; 35a, b; 120a, b). The latter type occurs only in Gastrosericus ammochares, eremicus, and temporalis, but not in the outgroup and clearly is an apomorphy.
15. Free margin of female clypeus: 0, lobe not subdivided into three arcuate portions: 1, lobe subdivided into three arcuate portions, of which the median is the largest and the lateral is
not angulate laterally (Figs. 65a, b; 100a, b; 135a). The latter type is found only in Gastrosericus lepidus, sabulosus, and umicolor.
16. Discal tubercles, discal teeth, or discal transverse carinae of female clypeus: 0 , absent; 1 , present. These structures are absent in most members of the outgroup, but present in Parapiagetia subpetiolata (Brèthes) and several members of the Paraptagetia crythropoda (Cameron) species group. These species are clearly specialized, and I therefore regard a simple clypeal disk as plesiomorphic. 1 tentatively accept that various discal structures in Gastrosericus are homologous, but I could not subdivide them into smaller categories because of intermediates. A disk with a median shiny swelling is regarded as unspecialized (c.g., Gastroscricus chalcithorax and pulchelhus).
17. Clypeal disk of male: 0 , simple; 1 , carinate or expanded into a lamella. The male of Gastrosericus attenuatus is unique among Larrini in having a carinate clypeal disk, and the male of lamellatus in having the clypeal disk expanded. The two structures appear to be homologous.
18. Inclination of inner orbits: 0 , orbits converging above; 1 , orbits parallel or diverging above (the orbits are converging above if they are closer to the hindocellar scar than to the socket. and parallel if they are equidistant from the antennal socket and the scar). The orbits converge toward the vertex in most members of the outgroup and in all other Larrini. They are parallel in some Parapiagetia and parallel or divergent toward the vertex in some Gastroscricus, apparently a reversal. I accept that, in Gustrosericus, the orbits converging above are plesiomorphic.
19. Length of antenna: 0 , antenna not elongate; 1 , antenna clongate (as in Gastrosericus attematus and lamellatus). The scape and flagellum vary in length throughout the Larrini (including the outgroup), although they are moderately long in most species. Consequently, the outgroup comparison alone does not sulfice to establish the polarity of the two states. I tentatively hypothesize, however, that the elongate antennae of attenuatus and lamellatus are derived because the two species deviate from the remaining Gastrosericus in sharing other unique structures that are clearly derived.
20. Pronotal precollar of female: 0 , ecarinate; 1 , carinate laterally. The pronotal precollar is ecarinate in all outgroup taxa, so this state is inferred to be plesiomorphic for Gastrosericus.
21. Sulcate pronotal side of female: 0 , sulcus absent or inconspicuous; 1, sulcus deep, conspicuous. The pronotal side is not sulcate in the outgroup except shallowly, inconspicuously sulcate in several Tachyspher. The deep, conspicuous sulcus of some Gastrosericus, unique within Larrini, is clearly derived.
22. Propleural preapical prominence: 0 , absent; 1 , present. The propleuron has no particular structures in the outgroup and most other Larrini. It has a glabrous, triangular elevation near hindmargin in several Gastrosertcus, e.g. walth and fulam (elevation pointing posterad). A somewhat similar clevation, found in punctutus, is ponctate and thus not homologous.
23. Propleural lateral expansion of female: 0 , absent; 1 , present but relatively short in Gastrosericus synander (Fig. 119); 2. prominent in madecassus, swalei, and zoyphion (Figs. 69g; 70a; $116 \mathrm{~h}, 1)$. These three states are treated as additive in the analysis. Except for these three species, the propleuron is not expanded laterally in Larrini. The states 1 and 2 are thus clearly apomorphac
24. I.ateral margin of scutum: 0 , flange present, evenly curved
throughout (Fig. 3a); 1, flange contrastingly concave near scutal hindcorner (Fig. 3b); 2, margin flat, not upturned into a flange; 3, expansion largely covering tegula in Gastrosericus eremicus (Fig. 36b-d). The three states are treated as additive in the analysis. The lateral scutal margin is upturned into a uniformly curved flange in the outgroup and other Larrinae.
25. Scutum: 0 , simple; 1 , swollen adjacent to tegula and with longitudinal depression next to swelling (Fig. 36b-d). The scutum is simple in all Larrini except swollen laterally and depressed next to swelling in Gastrosericus ercmicus and temporalis (only slightly so in the latter species), clearly an apomorphy.
26. Setae of female pygidial plate: 0 , present; 1 , absent. Pygidial setae in females of Larrini vary from thin to thick, dense to sparse, and appressed to partly erect (see Bohart and Menke 1976. Figs. 66 and 74, for examples). Bohart and Menke (1976: 224) regarded an asetose plate as the ancestral state in Larrinae. but they apparently meant a plate with sparse, inconspicuous setae. In fact, at least sparse, inconspicuous setae are present in Larrini (some setae are present even in members of the TachI'sphex albocinctus or Tachysphex julliani species groups whose pygidial plate appears to be glabrous unless examined carefully). The only exception is the fully asetose plate found in some Gastrosericus, e.g. lamellatus. Other states of the pygidial plate (such as stout or fine setae) were not used in the analysis because of the intermediates.
27. Pygidial plate of male: 0 , densely punctate; 1 , sparsely punctate. The pygidial plate of males is densely punctate in most Larrini (including the sister group). It is sparsely punctate in some specialized and unrelated Tachrsphex (e.g., gagates Arnold and vulneratus, individually variable in bruneiceps, fugax. and pemheri), none of which appear to share a unique common ancestor with Gastrosericus. The plate is sparsely punctate in Gastrosericus attenuatus, lamellatus, and siamensis. 1 regard as sparsely punctate the plate of praos, in which several punctures are close to each other but the setae are sparse.
28. Male sterna: 0 , setose throughout or nearly so; 1, largely glabrous. The sterna of male Gastrosericus are setose throughout or nearly so except largely glabrous in attemuatus and lamellatus. Both states occur in the outgroup: the sterna are setose throughout Holotachysphex and in most Tachysphex but largely glabrous in some specialized lineages such as the albocinctus and jullani species groups; sterna 1-111 are glabrous in Kohliella; and mostly setose in Parapiagetia except partly glabrous in some species such as kaszah Tsuneki. Since Gastroscricus attemuatus and lamcllatus are unlikely to share a unique common ancestor with either Kohliella or Parapiagetia, 1 accept that their glabrous sterna are apomorphic.
29. Fimbriate sternal depressions of male: 0 , absent; 1, present. Generally in Larrini the sterna are flat although shallowly depressed along the ir hindmargins. Sterna III and IV are mesally depressed and densely fimbriate in males of some Gastrosericus (e.g., nama, sanctus, wallii, and wroughtoni). Males of Holotachysphex have sterna II-IV depressed mesally and covered with velvety vestiture. These modifications do not appear to be homologous with those in Gastrosericus.
30. Setae of male sterna III and IV: 0 , about as dense as setae on sternum II, not forming apical flanges; 1. conspicuously denser than those of sternum II basally, concealing integument at least mesally but not forming well-defined apical fringes; 2 , concealing integument and forming well-defined apical fringes. The
three states are treated as additive in the analysis. States 1 and 2, found only in some Gastrosericus (e.g., moricei and waltiii. are clearly derived.
31. Length of marginal cell: 0 , cell long; 1 , cell short. The marginal cell is long in most Larrini, with the costal margin markedly longer than the apical truncation. The cell is somewhat shortened in Kohliella, Parapiagetia kaszabi, Parapiagetia tridentata Tsuneki, and Prosopigastra creon, but markedly shortened in Gastrosericus marginalis and shestakovi, in which the costal margin is about equal to the apical truncation or shorter.
32. Female forecoxal venter: 0 , slightly convex; 1 , concave; 2 , concavity delimited laterally by triangular prominence. In most Larrini, the ventral surface is slightly, evenly convex and setose. 11 is concave anteriorly along inner margin in Parapiagetia erythropoda, a member of a derived lineage, and the shape of its forecoxa. within the genus, must be a specialization and not a plesiomorphic condition. The forecoxal venter in Gastrosericus is either slightly, evenly convex or concave. The concave areas vary from species to species but they all appear to be homologous.
33. Male forecoxa: 0 , simple; 1 , with apical process. Male forecoxa is simple except expanded into a small apical process in Gastrosericus lamellatus and into a large apical process in attenuatus (both are apparently homologous).
34. Male foretrochanter: 0 , entire; 1 , emarginate. The male trochanter is entire in the outgroup and most other Larrini (emarginate basally in Ancistromma, Larropsis, and many Tachytes, none of which is likely to share a unique common ancestor with Gastrosericus). The entire trochanter of Gastrosericus attenuatus, drewseni, marginalis, and waltlii is thus hypothesized to be plesiomorphic, and the emarginate trochanter of most Gastrosericus to be apomorphic.
35. Ventral spines of female tarsomere $V: 0$, absent; 1 , present. These spines are absent in the outgroup except present in some specialized Tachysphex, e.g., erythropus and obscuripennis (Schenck). The spinose foretarsus of some Gastrosericus is thus an independently acquired specialization.
36. Male claws (symmetry): 0 , both claws equal in size; 1 , outer claw larger than inner claw. The claws are equal in size in most Larrinae, but the outer claw of the mid- and hindtarsi is markedly longer than the inner claw in males of the Parapiagetia erythropoda species group (a derived lineage) and also in males of some Gastrosericus, e.g., neavei and rothneyi.
37. Volsella: 0 , no apical process, dorsal margin smooth; 1 , with apical process, dorsal margin serrate; 2, apical process curved upwards, dorsal margin serrate (these states were coded as additive). In most members of the outgroup, the volsella is gradually narrowed toward the apex, and its dorsal margin is smooth. It is differentiated into an apical process in many members of the Parapiagetia erythropoda species group, a derived lineage unlikely to share a unique common ancestor with Gastrosericus, and the dorsal margin is serrate in Holotachysphex and some Tachysphex related to julliani Kohl (another lineage not closely related to Gastrosericus). In Gastrosericus, the volsella is either not differentiated apically and the dorsal margin is smooth (e.g.. lamellatus and waltlii), or the apical process is present, straight, and the dorsal margin is serrate (e.g., evemicus), or the process is curved upwards and the dorsal margin is serrate (most species).
38. Scapal setae: 0, short, appressed; 1, long, erect. Scapal
setae are usually short, straight, and appressed in the outgroup. They are long, sinuous, and erect in some specialized species such as Kohliella stevensoni Arnold, Tachisphex idiotrichus Pulawski and priesneri de Beaumont, and most members of the Tachysphex albocinctus species group. They are also long and erect in a few Gastrosericus such as waltlii and its relatives.
39. Genal setae: 0 , short; 1 , long (at least $0.6 \times$ basal mandibular width). Genal setae are short adjacent to the oral fossa in most members of the outgroup, but they are long in Kohliclla stevensoni Amold and some Tachysphex such as albocinctus (Lucas) and micans (Radoszkowski). These species are clearly not closely related to Gastrosericus and I therefore regard the short setae as plesiomorphic for the genus. Setae are short in most Gastrosericus, but long and sinuous in some, e.g., capensis and waltiii.
40. Hindfemoral setae: 0 , appressed, short; 1 , suberect, long. The hindfemoral setae are short, appressed (mostly not exceeding the midocellar diameter) in most members in the outgroup. They are conspicuously long on the ventral face in some specialized Tachysphex: brumeiceps, priesneri, and vitiensis $\mathbf{F}$. Williams. Hindfemoral setae are short in most Gastrosericus, but suberect and long on the hindfemoral venter in some (e.g., dentatus and waltii).
41. Yellow clypeal markings: 0 , absent; 1 , present. The clypeus is black or partly red in the vast majority of the outgroup species. Exceptions are some specialized Tachysphex (such as cheops de Beaumont) that live in extremely hot, dry habitats. The clypeus is also yellow in many Gastrosericus.
42. Yellow gastral markings: 0 , absent; 1, present. The gaster of most Larrini is black or partly or all red, but yellow markings are found in some Gastrosericus (e.g., braunsi, marginalis, and mirabilis).

## B. Autapomorphies

43. Mandibular apex of male: 0 , straight; 1 , hooked. The male of Gastrosericus attenuatus is unique within the Sphecidae in having an apically hooked mandible, with concave posterior margin.
44. Hypostomal carina of male: 0, straight; 1, expanded. Simple in Larrini except expanded in the male of Gastrosericus guigliae.
45. Additional genal carina of female: 0 , absent: 1 , present. A carina between the genal tooth and the hypostomal carina is present in the female of Gastrosericus braunsi. This carina is not found in any other member of the genus nor in the outgroup, so it is inferred to be apomorphic.
46. Free margin of male clypeus: 0 , without deep, lateral emargination; 1, with a deep, lateral emargination (that extends almosi to the frontoclypeal sulcus). Unique to Gastrosericus lamellatus.
47. Clypeal hevel of female: 0 , absent; 1 , present and delimited by carina. The bevel is absent or present in the outgroup and most Gastrosericus. A margined bevel of the female of Gastrosericus madecassus is thus apomorphic.
48. Postspiracular carina: 0 , simple; 1 , expanded. The postspiracular carina is simple in Larrini except expanded and partly covering the subalar fossa in Gastrosericus vedda, an obvious apomorphy.
49. Mesopleural ridge of female: 0 , absent: 1 . present. The mesopleural ridge in the female of Gastrosericus pratensis is unique within Larrini.
50. Mesopleural expansion of male: 0 , absent; 1 , present. The mesopleuron is expanded ventrolaterally in the male of Gastrosericus atternatus. Although remotely similar to the expansions in the male of Prosopigastra creon (Nurse), this structure is unique in Larrinae.
51. Lateral carina of female pygidial plate: 0 , present; 1 , evanescent. In most Larrini, including the sister group, the pygidial plate is present and margined by a carina on each side. The absence of a plate in Holotachysphex, clearly a derived condition, is probably related to its twig-nesting habits (several distantly related lineages that are twig nesters also lack a pygidial plate). The lateral carinae are evanescent in Gastrosericus mirabilis, Tachisphex erthropus (Spinola), Tachysphex mendozanus (Brèthes), and absent in Tachysphex nelarius Pulawski. The three Tachysphex are members of specialized lineages, and the reduction of lateral carinae is clearly derived. I therefore regard a laterally carinate pygidial plate as plesiomorphic for Gastrosericus, and the vestigial carinae of Gustrosencus mirabilis as apomorphic.
52. Female forecoxal pit: 0 , absent; 1, present. The forecoxal pit of Gastrosericus punctatus is unique within Larrini and thus an apomorphy.
53. Anterior forecoxal margin: 0 , simple: 1 , expanded into triangular prominence. The anterior prominence (Fig. 151d), found in the female of Gastrosericus zoyphion and nowhere else in Larrinae, is obviously derived.
54. Female forecoxal apex: 0 , simple; 1 , with projection. The apex is simple in most Larrini (including the outgroup), but it is expanded into a spine-like projection in Prosopigastra and in females of Tachysphex bohartorum Pulawski. Tachysphex hopi Pulawski, and Gastrosericus pratensis. I regard all these cases as apomorphies (the projections may be synapomorphic in the two Tachysphex).
55. Dorsal spines or setae of female mid- and hindbasitarsi: 0 , moderately long; 1 , markedly elongate. These setae are sparse, moderately long in most Larrinae, but dense, unusually long in Gastrosericus murahilis.
56. Male claws (length): 0 , not shortened, conspicuously longer than arolium; 1, shortened, about as long as arolium. The claws are not shortened, moderately long or elongate in the outgroup and other Larrini, but shortened in praos.
57. Volsellae: 0 , separate; 1 , fused. The volsellae are separate in the vast majority of Larrini. but fused in Gastrosericus attematus, Kohliella amula Pulawski, and Tachutes fucatus Arnold. These are clearly independent specializations.
58. Penis valve: 0 , about as thick basally as apically or with an apically thickened apical portion; 1, markedly thicker basally than apically. The penis valve is not thickened basally in most Larrinae, but markedly thickened in Tachysphex testaceipes Bingham, a member of a specialized lineage, and in Gastrosercus prass.

## ( . Unpolarized Characters

I was unable to polarize the following six transformation series 159-64) and have excluded them from the analysis:
59. Clypeal lobe of male: $a$, delimited (angulate) laterally; $\mathbf{b}$,
not delimited laterally. The clypeal lobe in male Larrini is either angulate laterally (thus clearly delimited), rounded, or pointed (in the last two cases, the free margin of the lobe forms a single curved line with rest of elypeal margin). Both types occur in Gastrosericus, the outgroup, and most other Larrini (e.g., Liris and Tachytes), but the lobe is only angulate in Ancistromma and only rounded in Larropsis.
60. Origin of episternal sulcus: The sulcus originates at the subalar fossa and extends ventrad a variable distance. The place of origin in the subalar fossa varies, and the extreme situations are: a, near middle of subalar fossa (e.g., Gastrosericus lamellatus and praos); b , near anterior end of subalar fossa, contiguous with postspiracular carina except dorsally (e.g.. Gastrosericus bambara and braunsi). State a is plesiomorphic (it occurs in the outgroup except in Parapiagetia), and state $b$ is apomorphic (those Gastrosericus with state b are not likely to have a unique common ancestor with Parapiagetia). There is, however, an array of intermediates. Two examples are: sulcus originating slightly before middle of the subalar fossa (e.g., Gastrosericus siamensts), and sulcus meeting ventral end of the postspiracular carina (e.g., Gastrosericus fluviatilis and turneri). Because of these intermediates, recognition of discrete states is not possible, and 1 have not used this character in my analysis.
61. Sternum VIII of male: $a$, rounded apically; $b$, emarginate apically. Male sternum V1II may be apically rounded (as in Parapiagetia) or emarginate (as in Holotachysphex and Tachlsphex), and both states occur in Gastrosericus, Kohliella, and some other Larrini such as Larra and Luris. Bohart and Menke (1976) thought that the apically rounded or truncate sternum VIII is ancestral in Larrini, but reversals have probably occurred. For example. Tachytes fucatus has two character states unique within the genus: volsellae fused and sternum VIII rounded. Since the first is unquestionably derived, the second may be derived as well (i.e., a reversal).
62. Sculpture: a, fine; b, coarse. Various types of body sculpture are found in Larrinae and other Sphecidae. Sculpture is fine in most Gastrosericus, but coarse on the head and thorax in neavei.
63. Vertex setae: $a$, appressed; $b$, erect. In most Sphecidae, including the outgroup, the vertex setae vary from appressed to erect, straight to sinuous, and short to long. Gastrosericus neavei and tumeri are the only species of the genus in which the vertex setae are erect (the genal setae are short, markedly shorter than in walthi).
64. Mesopleural setae: $a$, straight; $b$, sinuous. Both forms occur throughout the tribe. Straight in most Gastrosericus but sinuous in a few (e.g., phepheros and waltlii).

Phylogenetic Analysis. - Distribution of the 58 polarized characters discussed above is listed in Table 1. The first fortytwo are synapomorphies; the remaining 16 are autapomorphies and thus uninformative in establishing species relationships. Most characters are binary, but four have three states (28. the propleural lateral expansion, 39. setae of male sterna III and 1V, 41. female forecoxal venter, and 51. volsella) and one has four (29. the scutal margin). All of these multistate characters were treated as additive. I assume that mongolicus, of which I have seen no specimens, is identical to margmalis except for the characters given in the Key and Descriptions.

Hennig86, a microcomputer parsimony program by James S. Farris, was used for constructing cladograms (autapomorphies

Table 1. Character state matrix for Gastrosericus.

|  | Number: | 1 | 2 | 3 | 4 | 5 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 1234567890 | 1234567890 | 1234567890 | 1234567890 | 1234567890 | 12345678 |
| ancestor | 0000000000 | 0000000000 | 0000000000 | 0000000000 | 0000000000 | 00000000 |
| anmochares | 0000110011 | 101100?101 | 100200???? | 02??0??000 | 00000?000? | 00000??? |
| asthvorus | 0000010111 | 100001?001 | 100000???? | 01??0??000 | 10000?000? | 00000??? |
| attenuatus | 1000010000 | 0000011010 | 0001011100 | 0010000000 | 0010000001 | 00000010 |
| $a=y x$ | 000???? 001 | ????0?0?0? | ?0?10?0000 | 0?01?02000 | 000??000?0 | ?????000 |
| baobabicus | 1000010011 | 0000000000 | 0000000000 | 0001002000 | 1000000000 | 00000000 |
| bambara | 0000010111 | 1000000001 | 1000000000 | 0101002000 | 0000000000 | 00000000 |
| braunsi | 0000010111 | 1000000001 | 1000000000 | 0101012000 | 1100100000 | 00000000 |
| capensis | 0000111011 | 0010000000 | 0100000012 | 0001000010 | 1000000000 | 00000000 |
| chalchthorax | 0000000011 | 0000000000 | 0000000000 | 0001002000 | 0000000000 | 00000000 |
| dentatus | 0000111011 | 000000?000 | 010000???? | 00??0??011 | 00000?000? | 00000??? |
| drewseni | 0000111011 | 0010000000 | 0101000012 | 0000000111 | 0000000000 | 00000000 |
| electus | 0000000011 | 0000000000 | 0000000000 | 0001002000 | 1000000000 | 00000000 |
| eremicus | 0000110011 | 1011000101 | 1003100000 | 0201001000 | 1000000000 | 00000000 |
| eurypus | 0000000001 | 0000000000 | 0000000000 | 0001002000 | 0000000000 | 00000000 |
| fluvatilis | 0000010111 | 1000000000 | 1000000000 | 0101012000 | 0000000000 | 00000000 |
| fulam | 0000110011 | 0000000000 | 0100000012 | 0001000010 | 1000000000 | 00000000 |
| funereus | 0000010011 | 1000010001 | 1001000000 | 0101002000 | 0000000000 | 00000000 |
| gugliae | 0000110011 | 0000000000 | 0100000012 | 0001000010 | 1001000000 | 00000000 |
| herero | 0000010011 | 1000000101 | 1000000000 | 0101002000 | 1000000000 | 00000000 |
| nombori | 0000000011 | 0000000000 | 0000000000 | 0001102000 | 1100000000 | 00000000 |
| incisus | 0000000011 | 0000000000 | 0000000001 | 0001101000 | 1000000000 | 00000000 |
| karooensis | 0000000011 | 0000000000 | 0000000000 | 0001002000 | 0000000000 | 00000000 |
| lamellatus | 1000010000 | 0000001010 | 0000011100 | 0011000000 | 0000010000 | 00000000 |
| lepudus | 0000010111 | 1010100001 | 1000000000 | 0101002000 | 1000000000 | 00000000 |
| lucidus | 0000010011 | 0000000000 | 0000000000 | 0101002000 | 1100000000 | 00000000 |
| madecassus | 0011110011 | 1000000001 | 1021000000 | 0101002000 | 1000001000 | 00000000 |
| murabils | 0000110011 | 100000? 100 | 000000???? | 00??0??000 | 11000?000? | 10001??? |
| modestus | 0000110011 | 0000000100 | 0000000000 | 0001001000 | 0000000000 | 00000000 |
| mongoticus | 0100110011 | 0100000100 | 0000000000 | 1000100000 | 1100000000 | 00000000 |
| moricel | 0000000011 | 0000000000 | 0000000001 | 0001101000 | 1000000000 | 00000000 |
| nama | 0000111011 | 0000000000 | 0100000012 | 0001000010 | 1000000000 | 00000000 |
| neavel | 0000010111 | 1000000100 | 1000000000 | 0101012000 | 0000000000 | 00000000 |
| pnepheros | 0000111011 | 0000000000 | 0100000012 | 0001100111 | 1000000000 | 00000000 |
| praos | 000???? 010 | ??????0?0? | ?0?00?1100 | 0?00?0?000 | 0000??? 0 ? 0 | ?????101 |
| pratenses | 0000010011 | 1000010000 | 0000000000 | 0001002000 | 1000000010 | 00010000 |
| pulchellus | 0000010111 | 1000000001 | 1000000000 | 0101012000 | 0000000000 | 00000000 |
| punctatus | 0000000011 | 0000010100 | 0000000000 | 0001002000 | 0000000000 | 01000000 |
| rothney | 0000010111 | 1000000100 | 1000000000 | 0101012000 | 0000000000 | 00000000 |
| sabulosus | 0000010011 | 1010100101 | 1000000000 | 0101102000 | 0000000000 | 00000000 |
| sanctus | 0000000011 | 0000000000 | 0000000011 | 0001101000 | 1000000000 | 00000000 |
| senegalensis | 0000000011 | 0000000000 | 0000000000 | 0001002000 | 0000000000 | 00000000 |
| shestakow | 00????? 011 | ????0?0?0? | ? 1?10?0012 | 1?01?00111 | 100??0?0?0 | ??0??000 |
| stamensis | 0000000000 | 0000000000 | 0000000000 | 0001001000 | 0000000000 | 00000000 |
| simplex | 0000000000 | 0000000000 | 0001001000 | 0001000000 | 0000000000 | 00000000 |
| sobrimus | 0000000011 | 0000000000 | 0001000000 | 0001001000 | 0000000000 | 00000000 |
| swalet | 0001110011 | 1000010001 | 1021000000 | 0001002000 | 0000000000 | 00000000 |
| symander | 0000010011 | 1000000001 | 1011000000 | 0001002000 | 0000000000 | 00000000 |
| temporalis | 0000110011 | 1011000101 | 1002100000 | 0201001000 | 1000000000 | 00000000 |
| thoth | 0000010011 | 1000000001 | 1000000001 | 0101102000 | 1000000000 | 00000000 |
| lissa | 0000000001 | 0000000000 | 0001000000 | 0001002000 | 0000000000 | 00000000 |
| truncatus | 0000110011 | 1000000101 | 1001000000 | 0101001000 | 1000000000 | 00000000 |
| tuberculatus | 0000010011 | 1000010001 | 1000000000 | 0101002000 | 0000000000 | 00000000 |
| turner | 0000010111 | 1000000001 | 1000000000 | 0101012000 | 0000000000 | 00000000 |
| unicolor | 0000010011 | 1010100101 | 1000000000 | 0101012000 | 1000000000 | 00000000 |
| vedda | 0000010011 | 0000000101 | 1001000000 | 0001102000 | 1000000100 | 00000000 |
| waltlit | 0000111011 | 0010000000 | 0101000012 | 0000000111 | 0000000000 | 00000000 |
| wroughtoni | 0000010011 | 0000000000 | 0000000012 | 0001100000 | 1000000000 | 00000000 |
| xanthopilus | 0000110011 | 1000000001 | 1000000000 | 0101002000 | 1100000000 | 0000000 |
| zoyphion | 0011110011 | 0000000001 | 1021000000 | 0201002000 | 1000000000 | 00100000 |
| $y x$ | 0000????010 | ??????000? | ?0?10?0000 | 0?01?01000 | 0000?0?0?0 | ?????000 |

were excluded from the analyses). The implicit enumeration (ie) command, which generates trees guaranteed to be of minimum length, was attempted first. It proved to be prohibitively slow, and even the ie- option, which finds only one tree, was not com-
pleted in 240 hours on a 80486 microprocessor, 66 megahertz, personal computer. As the best approximation, the $\mathrm{m}^{*}$ command followed by bb* was subsequently chosen ( $\mathrm{m}^{*}$ constructs several trees, each by a single pass, adding terminals in several


different sequences, applies branch-swapping to each of the initial trees, and retains one tree for each initial one; $\mathbf{b b}^{*}$ applies extended branch-swapping to the trees in the current file and produces a new tree file that fills the available space if necessary). All characters were weighted (by repeating the $x s$ w; $m$ * command before the $\mathrm{bb}^{*}$ command until the consistency and the retention indices reached maximum value and stabilized). Weighting characters more than doubled the tree length because the algorithm assigned values of 0 to 10 to each character, depending on its consistency and retention index. Finally, strict consensus trees were generated.

Two analyses were conducted under the above premises: one with all species, including those with missing data, the other excluding the 8 species for which data were missing. The first analysis generated an unknown number of equally parsimonious phylogenctic trees, of which 810 were retained, filling the entire memory. Each has a length of 363, the consistency index of 78 , and the retention index of 94 . In the second analysis, the number of equally parsimonious trees was also unknown, the 1758 retained trees filling the memory. Each tree has length of 366 , the consistency index of 81 , and the retention index of 94 .

The two strict consensus trees resulting from the above analysis, processed using the Clados program of Kevin C. Nixon and subsequently modified, are shown in Fig. 5a and b. I feel that the trichotomy drewseni + shestakovi + wallhlu, unresolved in consensus tree 5a, should actually be expressed as shestakovi + (drewseni + walthii), because I regard the entire male foretrochanters (character $34_{1}$ ) of the latter two species as a synapomorphic reversal.

Other than the number of species considered, the two trees are largely identical. They differ in the internal branching and in the position of braumsi, puldchellus, and tumer, treated as a monopliyletic lineage by the second but not by the first tree. The lack of resolution for several species is not surprising, given the low number of synapomorphies (fewer than the number of species) and their incongruence. Gastrosentus siamensis and smplex are recognized as the least specialized members of the genus, each with only one derived character (sparsely punctate male pygidium and serrate volsellar margin, respectively).

Both trees recognize the following lineages:
(1) The sumplex $+($ praos $+($ attenuatus + lumellatus $))$ lineage, characterized by the sparsely punctate male pygidium, is the sister group of all other Gastrosericus (whose synapomorphy is a serrate dorsal volsellar margin). I suspect, however, that the sparsely punctate pygidium may have been acquired independently by smplex: by praos, and the common ancestor of attemutus and lamollatus (as it was in many Tachysphex). If so, the lineage is not monophyletic. Gastrosericus attermatus and lamellatus are sister species sharing four unique synapomorphies (antennae unusually long, female pygidial plate asetose, male clypeus with a lamella, and male forecoxa with apical process)
(2) (iastrosemous stamensis and then zy (in which the occipital carma joins the hypostomal carina, as it does in the stmplexlamedlatus lineage) are the sister species of all the remaining species (in which the two carinae are separated). Because of its unusual way of nest excavating, however, siamensis may be more spectalized than indicated by the morphological characters alone (see Life History below).

Among the remaining species, the following well-supported monophyletic lineages can be recognized:
(3)(a) the fulam-waltiii lineage of 9 species with long genal setae and a conical, glabrous propleural prominence. Another synapomorphy of this lineage, mesally depressed male sterna $1 I I$ and IV, is shared with sanctus and wroughtomi (the absence of depressions in some Egyptian males of waltlit must be a reversal, as this species is one of the three terminal taxa of the lineage).
(b) the vedda-temporalis lineage of 25 species, whose females have a sulcate propodeal side and a lateral pronotal carina (the pronotal carinae are secondarily lost in fluviatilis, neavel, and rothnevi).
(c) the symander + (swalei + (madecassus + zoyphion $)$ lineage, a subset of 3 b above, characterized mainly by the laterally expanded female prosternum; the other supporting synapomorphies are homoplasies.
(d) the lepudus-sabulosus-umcolor lineage is also a subset of 3b. The clypeal lobe, in the female, is subdivided into three arcuate portions.
(e) the truncatus + (ammochares + (eremicus + temporalis) ) lineage, another subset of 3 b , in which the lateral scutal margin is not upturned into a flange; the other supporting synapomorphies are all homoplasies. The sublineage ammochares + (ercmicus + temporalis) has a uniquely derived female clypeus, with a secondary middle lobe.

The two trees also include multiple convergences and reversals. Five noteworthy reversals are: (1) absence of lateral, longitudinal carina on the pronotum in fluviatilis, neavei, and rothnew; (2) a nonemarginate male trochanter of drewsem, marginalts, and waltlii (the nonemarginate trochanter of attenuatus and praos, however, may be either primitive or derived); (3) a volsella with a straight apical process in the truncatus-temporalis lineage and also in modestus, meisus, and moricei; (4) a volsella with a smooth dorsal margin and no apical process in the fulaniwaltlii lineage and in marginalis; and (5) a black clypeus of several species, including the fluviatilis-rothmey lineage and also dentatus, drewseni, and walth.

Infrageneric Classification.-Gastrosericus is so diverse morphologically that some kind of infrageneric classification seems logical at first, as pointed out by Bohart and Menke (1976). but attempts at subdividing the genus were not successful. Gussakovskij (1931) assigned the six Transcaspian and Mongolian species to three subgenera: Gastrosericus sensu stricto, Dinetomorpha. and Gastrargiron (these names are correctly attributable to Pate, see p. 4). His system breaks down, however, when forms from other areas are considered. Bohart and Menke (1976) recognized the waltit and the marginalis species groups, but left the majority of species unassigned (their first group roughly corresponds to Gastrosericus sensu stricto of Gussakovskij, the second is identical to Gastrargyront). My cladograms support Bohart and Menke"s opinion (1976:254) that "there is no practical way to divide Gastrosericus because of transitional forms", an opinion also expressed by Arnold (1922:114, 1927:116). This is especially true because large parts of the cladograms here proposed are still unresolved and some basic lineages are established on weak or questionable synapomorphies or homoplasies.

Life History. - Brauns (1911) reported ground nesting for
capensis, chalcithorax. and karooensis, and Amold (1922) for braunsi and lamellatus. Prey were recorded for simplex (Arnold, 1922), waltlii (Honoré, 1942), and madecassus (Amold, 1945). lwata and Yoshikawa (1974) studied the life history of siamensis, and Krombein (Krombein and Pulawski, 1986) described the life histories of asilivorus, rothneyi, and tissa. New observations on chalcithorax, electus, hombori, karooensis, senegalensis. siamensis, tuberculatus, and waltlii are reported under these species below. Available information can be summarized as follows:
(1) The nest is established in the ground (ground nesting is postulated for all members of the genus inasmuch as the females have a foretarsal rake and a pygidial plate).
(2) The wasps tend to nest on horizontal ground (nesting on slopes or on vertical banks was not observed).
(3) When digging the nest, females of electus and hombori remove soil with the foretarsal rake. In asilivorus, the female walks backwards holding a load of sand between her head and forecoxae, then drops the load. Digging process is similar in chaleithorax and karooensis. but the excavated material is kept in the mandibles. The female of siamensis flies backwards carrying a lump of sand between her head and forecoxae, throws the lump behind her while in flight, and returns to the nest; but she uses the foretarsal rake for closing and opening the nest.
(4) The material excavated is scattered by chalcithorax, electus, karooensis and siamensis, but deposited in a low, crescentic tumulus by asilirorus, in a round tumulus by hombori, and in a circular tumulus around the nest entrance by rothney.
(5) The nest burrow is perpendicular or strongly inclined ( $60^{\circ}-$ $90^{\circ}$ ), although it may start at a lesser angle ( $20^{\circ}-30^{\circ}$ ).
(6) Nests are multicellular in asilivorus, but either uni- or multicellular in rothneyi and siamensis.
(7) The nest is permanently open in asi/ivorus, chalcithorax, electus, and rothnevi (asilivorus makes a plug of loose soil a short distance below the surface). It is temporarily closed by siamensis when the female is away during the provisioning period.
(8) Females of chalcithorax and electus drop their prey at the open nest entrance, go inside, turn around, and drag the prey in; females of siamensis drop their prey at the closed nest entrance before opening and entering, whereas asilivorus and rothney' go directly inside without dropping the prey.
(9) The prey spectrum for Gastrosericus is broader than in other sphecid genera (except for scavengers such as Microbembex). Prey consists of small acridid nymphs (electus, karooensis, rothmeyt, senegalensis, tissa, tuberculatus), nymphal and adult tridactylid crickets (siamensis, stmplex), adult cicadellids (chalcithorax), and teneral adult asilids of the genus Xenomyza (asilivorus). I have observed females of senegalensis collecting both grasshoppers and fulgoroid homopterans. Honoré (1942) reported that walt lii preys upon nymphal gryllids, and I collected a female of this species carrying an oxyopid spider. Acrididae and flatid Homoptera are probable prey of madecassus. Bohart and Menke (1976) thought that the latter was an unlikely prey record, but my observations on senegalensis and walthii suggest that their skepticism was unwarranted (see madecassus for details). Gryllids are probably the ancestral prey, as they are used by the two least specialized Gastrosericus: siamensis and simplex.

One possible explanation for the broad variety of prey is
scarcity of suitable prey in extremely hot habitats in which most Gastrosericus occur. Under such harsh conditions, these wasps may not be able to use one kind of prey, but take whatever is available.
(10) The prey is transported on the ground and in short flights by electus and karooensis, in flight by asilivorus and siamensis. The acridid prey of electus is held dorsum up, but the tridactylid prey of siamensis is carried venter up. The acridid prey of tuberculatus is held by its hindleg with the wasp's mandibles while she walks backwards. Carrying prey while walking backwards is a method common in Pompilidae and some lower Sphecidae (such as Dolichurus) but unknown elsewhere in Larrinae.
(1) The number of prey per cell is as many as six in rothmeyi. two to ten in asilivorus, and unknown in other species.
(12) The egg is attached to the body of the asilid prey in asilivorus, but placed on the cell ceiling in rothneyi (the only known case in the Sphecidae), presumably before the first prey is brought in.

Geographic Distribution (Fig. 6).-Species of Gastrosericus are found in warm, dry areas of the Old World, in habitats that are fully exposed to the sun. The genus occurs throughout Africa, in the Arabian Peninsula north to southern Turkey, from Armenia to India and Sri Lanka, east to Vietnam, and north to Kazakhstan and Mongolia. No species have been observed in Europe, Malaysia, Indonesia, the Philippines, most of China, and the Australian Zoogeographic Region (Gastrosericus errans R. Turner, 1936, described from Western Australia and assigned to this genus because of its wing venation, actually is an aberrant member of Lyroda, as demonstrated by Menke, 1977). The highest species diversity is in West Africa, the second highest in Namibia and South Africa (Fig. 7). The relatively low numbers of species in many areas are certainly due to inadequate collecting, but Southeast Asia (Thailand, Vietnam) is unlikely to have many more than the three species currently known from there (moricei, rothnevi, siamensis).

Known ranges of individual species vary greatly in extent. Some are limited to one (ammochares, mirabilis, mongolicus. zoyphion) or two localities, while others spread over two continents and three zoogeographic regions. The following 11 major distribution types can be recognized:
(1) Afro-Mongolian. Gastrosericus waltlii is the most widely distributed of all species, ranging from Namibia to Mongolia and Sri Lanka (Fig. 144). It is the only representative of the genus that reaches the Mediterranean islands (Cyprus, Rhodes).
(2) Afrotropical (extending over most of the African continent but unknown from North Africa). This type includes neavei, sanctus, swalei (extends to Israel, Saudi Arabia, and Pakistan), sobrinus, turneri, and unicolor. Gastrosericus praos, known only from the type locality in Congo, may belong here.
(3) Southern African. Represented by braunsi, capensis (only Namibia and Cape Province of South Africa), chalcithorax (only Namibia and western South Africa), eurnpus (only western South Africa), herero (only Namibia), lamellatus (extends north to Kenya), karooensis, mirabilis (only one locality in Namibia), modestus, nama (only Namibia), pratensis, pulchellus, smplex. tuberculatus, xanthophilus (only Namibia and western South Africa), and $z 1 x$ (only eastern Zambia).
(4) West African. Represented by ammochares, attenuatus (extends south to Congo River basin), hambara, haohabicus.

Figure 6. Geographic distribution of Gastrosericus (shadowed area).


Figure 7. Number of species of Gastrosericus in squares of 15 degrees of lathtede and longitude.
dentatus, fluviatilis (extends to Sudan), fulani, hombori, lepidus, lucidus, punctatus, senegalensis, synander, temporalis, and truncatus.
(5) Northeast African. Of the four species placed here, drewseni and guigliae occur essentially along the Mediterranean coast, whereas pnepheros is found essentially along the Nile River valley, and thoth has been found near Cairo area, Egypt and in the Sinai Peninsula.
(6) Madagascan. Gastrosericus madecassus and zoyphion are endemics of Madagascar and the only members of the genus found there.
(7) Egypto-Transcaspian. Represented only by marginalis.

Gastrosericus shestakovi, known only from Turkmenistan, Uzbekistan, and Pakistan, may belong here.
(8) Indo-Saharan. Included species: electus, eremicus, funereus (ranges more to the north than the remaining members of this type), moricei, sabulosus, and vedda.
(9) Indo-Sri Lankan. Gastrosericus asilivorus and $a z y$ are known only from Sri Lanka, incisus and tissa occur in both Sri Lanka and adjacent India, and wroughtomi extends from Pakistan to Sri Lanka.
(10) Indo-Vietnamese. Represented by rothney and siamensis
(11) Mongolo-Chinese. Gastrosericus mongolicus is known
only from the type locality in the Mongolian Autonomous Region of China (perhaps a synonym of margmalis).

These distribution types coincide with the distribution of habitats rather than the currently recognized zoogeographic regions. For example, only six African species (one region) are found both north and south of the equator, and the same number of species are shared by India, Pakistan, and western Africa (three regions). This is probably because the dry, hot areas with sandy soils (favored by Gastrosericus) extend from West Africa to India, but not from West to southern Africa.

Historical Analysis. - Only two pairs of sister species established by the cladistic analysis occur in allopatric situations, thus providing a meager basis for historical analysis. They are attenuatus and lamellatus as well as madecassus and swater. The two pairs are not closely related to each other, and their possible history is discussed below.

One could think that the common ancestor of madecassus (Madagascar) and swalei (Africa) inhabited both arcas prior to their separation in early Cretaceous and that it differentiated into two species following the split. This scenario, however, is not supported by available fossil evidence. Modern sphecids are unknown from early Cretaceous, and numerous sphecid-like fossils of that age that 1 examined all belong to extinct genera (property of the Paleontological Muscum, Moscow, Russia). 1 therefore hypothesize that the common ancestor of madecassus and swalei migrated from one area into the other over water at some later time, and subsequently differentiated.

The origin of the African species attemutus and lamellatus may be linked to the large Tertiary lake that covered the Congo Basin and drained itself into the Atlantic Ocean some 15,000 years ago (Bridges, 1990). The originally continuous range of their common ancestor was probably divided by the rising waters, and each of the two populations differentiated into a separate species, one to the north, the other south of the lake. Two other species, similis and sobrimus, have a simılar distribution and perhaps the same origin. Very close morphologically, they may be sister species as well. although this has not been demonstrated.

Unsolved Problems. - The following are still unsolved problems:
(1) Insufficient material. Some species are known from one (murahilis, mongoheus, prans) or two specimens (astivorus, dentatus. Incisus, and z.1.), and nine are known from one sex only (ammochares asilivorus, azix, dentans, mirahilis, mongolicus, praos, shestukory, and zy). I have seen no specimens of mongolucus (the only known individual has been lost). Since 1989, 1 collected previously unknown Gastrosericus on each expedition. and future fieldwork will almost certainly yield additional species. The geographic ranges of many species are known only approximately (in Mali, for example, most records are along the Bamako-Gao road, mainly as a result of my 1991 visit to that country). Tropical Africa, the Middle East, India, and Indochina appear to be the least explored areas.
(2) Inadequate knowledge of life histories. Some biological information is available for only 16 ol the 61 currently recogmized species. This is grossly inadequate, especially because GusWesertus are so diverse in their nest building methods and prey selection
(3) No information is available for preimaginal stages.
(4) The plyylogenetic tree here produced is largely unresolved
and should be improved based on new synapomorphies. Behavioral and larval characters, not used here because of insufficient data, are obvious sources for these.

## Key to Species

The characters used in the keys require fresh material with well-preserved pilosity. Specimens may be misdetermined if the suberect setac become appressed owing to moisture, and identifications should be carefully checked with species diagnoses and descriptions in order to avoid errors.

Three species known from one sex are included in the key to the opposite sex based on characters that are not sexually dimorphic (the indication "presumed" is used in all cases).

## $9 \%$

The unknown females of praos and zyx are not included.

1. Setal length, adjacent to oral fossa, at least $0.6 \times$ basal width of mandible, setae in many specimens sinuous (Fig. 143a); propleuron, near hindmargin, with glabrous, triangular elevation that points posterad (Fig. 143b).

- Setal length, adjacent to oral fossa, no more than $0.3 \times$ basal width of mandible, setae straight; propleuron without triangular elevation (except elevation present in punctatus), with conical elevation in some species.

2. Marginal cell (Fig. 105b): length of costal margin 1.1-1.2 $\times$ apical truncation; Pakistan, Turkmenistan, Uzbekistan. shestakov Gussakovskij (presumed), p. 124

- Marginal cell: length of costal margin 1.5-2.8 $\times$ apical truncation.

3
3. Free margin of clypeal lobe with five teeth (Fig. 30a): Senegal to Ghana. dentatus sp. n., p. 44

- Free margin of clypeal lobe not dentate. 4

4. Scape and hindfemur with appressed setac. 5

- Scapal and hindfemoral venters with semierect setae. 8

5. Free margin of clypeal lobe obtusely pointed (Fig. 49a); Egypt, Libya.
guigliae de Beaumont, p. 63

- Free margin of clypeal lobe arcuate (Figs. 25a; 43a; 80a); western and southern Africa.

6. Free margin of clypeal lobe not angulate laterally, convex portion of free margin narrow (Fig. 25a); upper front with semierect setae; inner mandibular margin with large preapical tooth (Fig. 25b). cupensis Brauns, p. 37

- Free margin of clypeal lobe angulate laterally, convex portion of free margin broad (Figs. 43a, 80a); frontal setae appressed; inner mandibular margin with small preapical tooth or without preapical tooth

7. Free marg in of clypeal lobe weakly angulate laterally (Fig. 80a); setae straight on thorax and adjacent to oral fossa; inner mandibular margin with small preapical tooth (Fig. 80b).
nama sp. n., p. 97

- Free margin of clypeal lobe markedly angulate laterally (Fig. 43a): most thoracic setae sinuous, as are setae adjacent to oral fossa; inner mandibular margin without preapical tooth (Fig. 43b).
fillam sp. n., p. 58

8. Clypeus yellow, clypcal lobe shorter (Fig. 86a), apical tarsomere of all legs with two or three conspicuous basoventral spines (Fig. 86c). pnepheros sp. n., p. 101

- Clypeus all black or red or yellowish anteromesally,
clypeal lobe longer (Figs. 31a-d; 142a, b); apical tarsomere basoventrally at most with small, inconspicuous spines.

9. Lateral margins of clypeal lobe convergent anterad, front margin truncate or subtruncate (Fig. 142a, b); gaster all black or red basally and black apically; Africa to Sri Lanka, Transcaspia, and Mongolia.
waltlii Spinola, p. 160

- Clypeal lobe obtusely pointed (Fig. 3la-d); gaster in most specimens all red; Jordan to Libya
drewseni Dahlbom, p. 44

10. Marginal cell: costal margin shorter than apical truncation (Fig. 72d); posterior mandibular margin entire (Fig. 72c).

- Marginal cell: costal margin longer than apical truncation; posterior mandibular margin notched or stepped.

12
11. Egypt to Transcaspia. margınalis Gussakovskij, p. 88

- Inner Mongolian Autonomous Region of China. mongolicus Gussakovskij, p. 91

12. Mandible elongate (Figs. 12c; 60d) and gaster all black (shortest distance between mandibular acetabulum and apex $4.8-5.8 \times$ basal width); length of flagellomere I $2.2-3.0 \times$ apical width; distance between hindocellar scar and orbit about equal to midocellar diameter; pygidial plate asetose; Afrotropical. 13

- Mandible not elongate (shortest distance between acetabulum and apex about $3.6 \times$ basal mandibular width) except elongate in baobabicus (Fig. 20c), in which the gaster is all or largely red; length of flagellomere I no more than $2.0 \times$ apical width ( 2.2 in baobabicus); distance between hindocellar scar and orbit in most species markedly longer than midocellar diameter; pygidial plate in most species setose (at least apically). 14

13. Free margin of clypeal lobe weakly arcuate, alnost straight (Fig. 12a, b); inner mandibular margin with subbasal cleft (Fig. 12c); pygidial plate sparsely punctate; Ghana to Niger to Congo.
attemuatus Turner, p. 26

- Free margin of clypeal lobe sinuate (Fig. 60a-c); inner mandibular margin without cleft (Fig. 60d); pygidial plate impunctate; Kenya to Namibia and Natal.
lamellatus Turner, p. 74

14. Pygidial plate uniformly covered with stout, conspicuous setae and gaster at least partly red; apical tarsomeres at least with one basoventral spine (spines lacking in occasional sanctus).

- Pygidial plate all or partly asetose or with setae that are inconspicuous, sparse anteriorly and dense, stout posteriorly; and/or gaster black; apical tarsomeres with or (most species) without basoventral spines.

15. Clypeal lip emarginate mesally (Fig. 56a, b); southern India, Sri Lanka.
incisus sp. n., p. 68

- Clypeal lip not emarginate. 16

16. Clypeal lobe markedly prominent mesally and markedly concave near corner (Fig. 123a); gena obtusely angulate (Fig. 123c); hindfemur and all tibiae without yellow markings; pronotal side sulcate (as in Fig. 36a). thoth sp. n., p. 137

- Clypeal lobe almost evenly arcuate or slighty sinuate;
gena simple; hindfemur and tibiae with yellow markings; pronotal side not sulcate (exceptions in some sanctus).

17. Apical depressions of terga I-V yellow; pygidial setae sparse, not concealing integument (Fig. 54d).
hombort sp. n., p. 67

- Apical depression of terga I-V translucent, not yellow; pygidial setae dense, entirely concealing integument. 18

18. Free margin of clypeal lobe arcuate (Fig. 78a, b), not thickened laterally, without lateral tubercles; venter of tarsomere V with one to four basomedian spines (Fig. $78 \mathrm{a}, \mathrm{b}$ ) in addition to spines on lateral margins). morncei E. Saunders, p. 92

- Free margin of clypeal lobe in most specimens slightly sinuate (Figs. 102a, b; 103a, b), slightly thickened laterally (Fig. 103b); venter of tarsomere V with one or occasionally no or two basomedian spines (in addition to spines on lateral margins). sanctus Pulawski, p. 119

19. Pronotal side sulcate (as in Fig. 36a), only weakly so in some fluviatilis which has distinctive clypeus (Fig. 4la, b). 20

- Pronotal side not sulcate. 44

20. Propleuron expanded posterolaterally into conspicuous process (Figs. 69g, 116h, i; 119); clypeal disk without tooth.

- Propleuron rounded except expanded posterolaterally in some funcreus in which the clypeal disk has transverse carina or pair of teeth (Fig. 45a-f). 24

21. Propleural process short, rounded (Fig. 119), about equal to $0.5 \times$ basal mandibular width; mandible: inner margin with tooth (Fig. 118e), apex of condylar ridge stepped. sinander sp. n., p. 136

- Propleural process wing-like, in most specimens longer than basal mandibular width (Figs. 69g; 70a; 116h, i); mandible: inner margin without tooth (Figs. 69d; 116d), apex of condylar ridge rounded (Figs. 69e, 116e). 22

22. Posterior mandibular margin slightly concave between base and notch; middle clypeal section with two oblique teeth on disk, with inconspicuous lateral corner (Fig. $116 \mathrm{a}, \mathrm{b}$ ); genal tooth placed some distance above mandible base (Fig. 116f, g); forecoxa simple; gaster black; continental Africa. swalet Turner, p. 132

- Posterior mandibular margin convex between base and notch (Fig. 69e); middle clypeal section with no teeth; genal tooth, if present, placed next to mandible base; forecoxal foremargin expanded into tooth; gaster red; Madagascar.

23
23. Middle clypeal section with sharply delimited, triangular bevel (Fig. 69a-c); gena with prominent tubercle adjacent to mandibular base (Fig. 69f); forecoxa without preapical tooth.
madecassus (Kohl), p. 85

- Middle clypeal section without bevel (Fig. 151a, b); gena simple; forecoxa with preapical tooth (Fig. 151d).
zopphion sp. n., p. 169

24. Tarsomeres $V$ with basoventral spines (Figs. 101a; 140c, d).

- Tarsomeres V without such spines. 26

25. Gena simple; free margin of clypeal lobe sinuate, angulate laterally (Fig. 138a, b, d), with lateral tooth in some specimens (Fig. 138c, e); postspiracular carina of many
specimens expanded into rounded, yellow lamella that partly covers anterior part of subalar fossa (Fig. 140a, b); length $4.5-5.5 \mathrm{~mm}$; Ghana. Arabian Peninsula, Pakistan to Sri Lanka.
redda Pulawski, p. 154

- Gena dentate (Fig. 100d); free margin of clypeal lobe divided into three arcuate portions, corner ill-defined, postspiracular carina not expanded, length $7.0-8.0 \mathrm{~mm}$.

$$
\text { sahulosus sp. n., p. } 116
$$

26. Pronotal precollar without lateral, longitudinal carina; propodeal side and hindface with well-defined punctures that are larger than punctures on gena adjacent to orbit (genal and propodeal integument not concealed by vestiture); clypeal lobe with narrow median process, broadly emarginate on each side of process (Fig. 4la, b; 83a, b; $97 \mathrm{a}, \mathrm{b}$ ); pygidial plate densely setose (except at the very base).

- Pronotal precollar with lateral, longitudinal carina (as in Fig. 36a); propodeum without well-defined punctures, or punctures microscopic, similar in size to genal punctures adjacent to orbit (genal and or propodeal punctures concealed by vestiture); clypeus not as above; pygidial plate sparsely setose at least on basal half.

27. Setae erect on vertex and scuium (setal length on vertex about $0.5 \times$ basal width of mandible); frons and thorax coarsely sculptured; clypeal lobe with single lateral point (Fig. 83a, b).
neavel Turner, p. 97

- Setae appressed on vertex and scutum: frons and thorax linely sculptured; clypeal lobe with two lateral points (Fig. 4la, b: 97a, b).

28. Gena with two teeth (Fig. 97d); free margin of clypeal lobe markedly concave between median projection and corner (Fig. 97a, b); Oriental. rotheri Cameron, p. 114

- Gena with one tooth (Fig. 4ld); free margin of clypeal lobe barely concave between median projection and corner (Fig. 41a, b); western Africa to Sudan.
flunuthlis Arnold, p. 57

29. Clypeal disk with a pair of teeth or transverse carina that can be straight or V -shaped, enture or interrupted mesally (Fig. 45a-f); clypeus black. Junercus Gussakovskij, p. 60

- Clypeal disk without teeth or transverse carina (with glabrous swelling in lepudus in which the clypeus is yellow).

30. Scutum laterally by tegula gradually rising but not sharply upturned into flange, margin straight or expanded over tegula and contrastingly concave near scutal hindcorner (Figs. 3b, 36b-d), although slightly so in some specimens; inner mandibular margin with no subbasal tooth (Figs. $8 \mathrm{~d} ; 35 \mathrm{c} ; 120 \mathrm{c} ; 128 \mathrm{c}$ ).

- Scutum laterally with sharply upturned flange (as in Fig. 3a). margin evenly curved between tegular foremargin and scutal hindcorner; inner mandibular margin with well developed subbasal tooth (e.g., Figs. 10d: 148e).

31. Clypeus projecting mesally into narrow prominence whose sides converge anterad (Fig. 35a, b); scutum swollen adjacent to tegula, longitudinally concave next to swelling (Fig. 36b-d). cremucus sp. n., p. 49 Clypeus projecting mesally into essentially rectangular prommence (Figs. 8a, b; 120a, b; 128a, b); scutum laterally not or minimally swollen, longitudinal concavity ahsent or rudimentary
32. Clypeal median projection large (projection corners approximately as far from orbits as from each other), flanked by deep impression that extends almost to frontoclypeal suture (Fig. 120a, b) temporalis de Beaumont, p. 137

- Clypeal median projection smaller (projection corners markedly closer to each other than to orbit), free margin not emarginate or emargination shorter.

33. Clypeal median projection flanked by shallow concavity (Fig. 128a, b); forecoxa not concave along inner margin.
truncatus sp. n., p. 144

- Clypeal median projection flanked by well-defined emargination (Fig. 8a, b); forecoxa concave along inner margin, concavity asetose, sharply margined laterally, thus contrasting with remaining integument.
ammochures sp. n., p. 25

34. Clypeal disk with median tubercle (Fig. 131a-e); free margin of clypeal lobe almost straight in many specimens (Fig. 13la, b), Namibia.
tuberculatus sp. n., p. 146

- Clypeal disk without median tubercle (with a pair of teeth in asilisorus): free margin of clypeal lobe markedly prominent mesally, arcuate, sinuate, or emarginate mesally and or laterally.

35. Free margin of clypeal lobe evenly arcuate (Fig. 67a, b), lobe corner not projecting: gena simple: gaster with yellow markings.
lucidus sp. n., p. 81

- Free margin of clypeal lobe different; gena with one or two teeth; gaster with or without yellow markings. 36

36. Corner of clypeal lobe at least as prominent as median part (Fig. l48a-d); pygidial plate yellow; length 5.47.3 mm .
.xanthophilus sp. n.. p. 166

- Corner of clypeal lobe absent or less prominent than median part; pygidial plate yellow, red, or black; length $6.5-11.0 \mathrm{~mm}$.

37. Vertex setae erect (Fig. 133d). turnert Arnold, p. 150

- Vertex setae appressed

38. Clypeus (Fig. 10a, b): free margin with a pair of conspicuous emarginations that subdivide lobe into narrow median and two lateral portions: disk of median portion with two teeth; Sri Lanka. asilivorus Pulawski, p. 25

- Clypeal free margin not subdivided or, if subdivided, the median portion is the largest, disk without teeth; Afrotropical.

39. Free margin of clypeal lobe subdivided into three arcuate portions (median portion largest), truncate in some specimens; rounded laterally (Figs. 65a, b; 135a).

- Free margin of clypeal lobe sinuate, angulate laterally (e.g., Figs. 23a, b; 52a, b).

40. Clypeal disk raised and glabrous along midline (Fig. 135a) except basally; forecoxa concave anteromesally, foremargin raised near middle; gaster largely black, apex with yellow markings in many specimens.
unicolor Arnold, p. 151

- Clypeal disk with transverse or $\mathrm{Y}^{\prime}$-shaped, glabrous swelling (Fig. 65b); forecoxa flat; gaster red, without yellow markings.
lepudus sp. n., p. 81

41. Free margin of clypeal lobe weakly convex (Fig. 52a, b); pygidial plate asetose except for a few fine setae at apex.
hererosp. n., p. 64

- Free margin of clypeal lobe markedly convex (Figs. 18a,
b; 23a, b; 92a, b); pygidial plate with numerous setae, at least apically.

42. Clypeal lobe longer (Figs. 23a, b); gena with carina that connects genal tooth to hypostomal carina; tergum $V$ of most specimens with yellow fascia.
braunsi Arnold, p. 35

- Clypeal lobe shorter; gena without carina between tooth and hypostomal carina; gaster without yellow.

43
43. Free margin of clypeal lobe with expansion midway from tip to lateral corner (Fig. 18a, b); gena with one tooth (Fig. 18d); Senegal to Burkina Faso.
bambara sp. n., p. 31

- Free margin of clypeal lobe evenly sinuate (Fig. 92a, b); gena with two teeth (Fig. 92d). pulchellus Arnold, p. 109

44. Clypeal disk with a transverse carina (Fig. 95a, b); mesothoracic punctures mostly more than one diameter apart, interspaces shiny; forecoxa with round pit anteromesally (Fig. 96a).
punctatus sp. n., p. 112

- Clypeus without transverse carina; mesothoracic punctures no more than one diameter apart, interspaces in most species dull; forecoxa without pit.

45. Clypeal disk with a pair of minute tubercles (Fig. 89a, b); gena with tooth (Fig. 89d); mesopleuron anteriorly with subvertical ridge (Fig. 89e) that is evanescent in small specimens; hindcoxa with apical spine (Fig. 89 g , h); Namibia, Zimbabwe. pratensis Arnold, p. 106

- Clypeal disk without tubercles; gena without tooth; mesopleuron simple; hindcoxa without apical spine. 46

46. Clypeal lobe unusually broad (Fig. 20a, b): shortest distance between corners $7.3-7.5 \times$ distance between corner and orbit; mandible elongate (Fig. 20c): distance between acetabulum and mandibular apex $4.7 \times$ basal mandibular width; hindfemur largely red, hindtarsus in many specimens contrastingly dark. haobabicus sp. n., p. 33

- Clypeal lobe narrower; mandible not clongate: shortest distance between acetabulum and mandibular apex no more than $3.6 \times$ basal mandibular width; hindtarsus not darker than hindfemur.

47. Clypeal lobe truncate (Fig. 74a, b); pygidial plate with evanescent lateral carina; mid- and hindtarsomeres with numerous dorsal setae that are about twice as long as tarsomere diameter (Fig. 74e): Namib Desert. murabilis sp. n., p. 89

- Clypeal lobe arcuate; pygidial plate with well-defned lateral carinae; mid- and hindtarsomeres with two to four dorsal spines that are $1.0-1.5 \times$ diameter of tarsomere long.

48. Clypeal lobe subdivided into median projection and lateral, angulate expansion (Fig. 75a, b); distance between projection corners $1.4 \times$ distance between corner and orbit; distance between hindocellar scar and orbit 1.9$2.0 \times$ scar length; South Africa to Namibia and Zimbabwe. modestus Arnold, p. 90

- Clypeal lobe not subdivided; distance between hindocellar scar and orbit $0.6-1.1 \times$ scar length.

49. Clypeal lobe narrower (Fig. 145a): distance between corners $1.6 \times$ distance between corner and orbit: inner mandibular margin: only proximal subbasal tooth present, cleft broadly rounded (Fig. 145b); pygidial plate with many preapical setae (Fig. 145 d ); venter of apical tar-
somere with two or three spines on midline (Fig. 145c): Pakistan to Sri Lanka. wroughtom Cameron, p. 163

- Clypeal lobe broader: distance between corners at least $1.9 \times$ distance between corner and orbit; mandibular inner margin with one or two subbasal teeth, cleft acutely angulate; pygidial plate at most with a few preapical setae; apical tarsomere without spines on ventral midline. 50

50. Clypeal lobe narrower: distance between corners 1.9-2.0 $x$ distance between corner and orbit (Fig. 38a); length of hindtarsomere IlI 1.3-1.4 $\times$ apical width (Fig. 39a); Cape Province of South Africa. eurpus sp. n., p. 53

- Clypeal lobe broader: distance between corners 2.2-2.7 $\times$ distance between corner and orbit; length of hindtarsomere III 1.5-1.8 $\times$ apical width.

51. Clypeus (except basally) narrowly raised and glabrous along midline (Fig. 27a); gaster red basally; femora conspicuously yellow apically; Namibia, South Africa.
chalcithorax Arnold, p. 40

- Clypeal disk not raised along midline, entirely setose or with glabrous apicomedian area; in the latter case, gaster black and femora black or narrowly yellow apically. 52

52. Scapal venter yellow. 53

- Scapal venter black except translucent apically, narrowly yellow basally in some specimens.

53. Gaster all red; at least hindfemur red or reddish (yellow apically); Sahel, Arabian Peninsula to Uzbekistan and northern India. electus Nurse, p. 46

- Gastral apex black; femora black (yellow apically); Sri Lanka.
$a z y$ sp. n., p. 00 (presumed)

54. Asia. 55

- Africa. 56

55. Gaster all black; scutal flange evenly curved throughout (as in Fig. 3a); India to Thailand.
stamensis Tsuneki, p. 126

- Gaster red basally; scutal flange slightly expanded near tegular midlength, concave between expansion and scutal hindcorner (as in Fig. 3b); southern India, Sri Lanka. tissa Pulawski, p. 139

56. Foretarsomeres II and III slightly expanded apicolaterally (Fig. 115a), length of foretarsomere III about equal to width. sobrımus sp. n., p. 130

- Foretarsomeres II and IlI not expanded or minimally expanded apicolaterally; length of foretarsomere III1.2$1.3 \times$ apical width.

57. Head longer in frontal (Fig. 110a), thicker in dorsal view (Fig. 110d); scutal flange slightly expanded near tegular midlength, contrastingly concave between expansion and scutal hindcorner (as in Fig. 3b); mesopleuron with minute but-well-defined punctures, vestiture not obscuring integument; South Africa to Namibia and Zimbabwe. simplex Arnold, p. 128

- Head shorter in frontal, thinner in dorsal view; scutal flange evenly concave throughout (as in Fig. 3a); mesopleuron uniformly microsculptured, vestiture obscuring integument.

58. Outer apical spine of foretarsomere IV equal to about 0.5 of apical width of tarsomere; gaster varying from all black to all red; Africa south of equator.
karooensis Brauns, p. 71

- Outer apical spine of foretarsomere IV equal to apical
width of tarsomere or longer: gaster all red; West Africa. senegalensis Arnold, p. 122


## Ô

Unknown in this sex and not included: ammochares, astlivorus, dentatus. mirabilis.

1. Setal length, adjacent to oral fossa, at least $0.6 \times$ basal width of mandible, setae in most specimens sinuous (Fig. 143); propleuron, near hindmargin, with glabrous, triangular elevation that points posterad (Fig. 143b).

- Setal length, adjacent to oral fossa, no more than $0.3 \times$ basal width of mandible, setae straight: propleuron without triangular elevation (except elevation present in punctatus), with conical elevation in some species.

2. Hindfemoral setae appressed.

- Hindfemoral setae semierect at least on outer side. 6

3. Hypostomal carina expanded near mandibular base (Fig. 50a): Egypt, Lıbya. giligluae de Beaumont. p. 63

- Hypostomal carina not expanded.

4. Free margin of clypeal lobe acutely angulate (Fig. 25c); most setae of upper frons semierect; Namibia, South Africa. capensts Brauns, p. 37

- Free margin of clypeal lobe arcuate or obtusely angulate (Fig. 43c; 80c); frontal setae appressed.

5. Mesopleural setae straight; sterna V and VI: setae that delimit apical depressions markedly longer than remaining setae; Namibia. nama sp. n., p. 97

- Mesopleural setae sinuous; all setae of sterna V and VI of equal length; Senegal to Togo.

İlamisp. n., p. 58
6. Scapal venter with appressed setae. dentatus sp. n. (presumed), p. 44

- Scapal venter with semierect setae.

7. Clypeus yellow; free margin of lobe obtusely pointed; foretrochanter notched basoventrally (Fig. 107).

- Clypeus all black or ferruginous apically; free margin of lobe acutely angulate; foretrochanter not notched (but slightly constricted near base).

8. Marginal cell (106b): length of costal margin about 1.11.2 * apical truncation; Pakistan. Turkmenistan, Uzbekistan. shestakowi Gussakovskij. p. 124

- Marginal cell: length of costal margin 2.4-3.0 $\times$ apical truncation, Egypt, Sudan. phepheros sp. n., p. 101

9. Gastral segment VII black (gaster black or three or four basal segments red); tibiae black to red except light brown ventrally: Africa to Srı Lanka, Transcaspia, and Mongolia. walth Spinola, p. 160

- Gastral segment V1l red (gaster all red or red basally and black preapically): tıbiae all red or brown on venter; Jordan to Libya. drewsem Dahlbom, p. 44

10. Marginal cell: costal margin shorter than apical truncation (Fig. 72d); posterior mandıbular margin entire; gaster with pale yellow markings.

- Marginal cell: costal margin longer than apical truncation; posterior mandibular margin notched or stepped, gaster in most species without yellow markings. 12

11. Flagellomere 1 and following ones slightly longer than wide: Egypt to Transcaspia.
murginulis Gussakovskij, p. 88

- Flagellomere 1 and following ones markedly longer than
wide (after Gussakovskij, 1931); Inner Mongolian Autonomous Region of China.
mongolicus Gussakovskij, p. 91

12. Dorsal length of flagellomere I 2.2-3.0 $\times$ apical width; forecoxa modified (see couplet I 3 for details); sterna IIV1 largely glabrous; pygidial plate sparsely punctate; Afrotropical.

- Dorsal length of flagellomere 1 less than $2.0 \times$ apical width; forecoxa simple; sterna setose (except in praos); pygidial plate in most species densely punctate. - ..- I
2 13. Clypeus (Fig. 13a-c): free margin not emarginate laterally, middle section with swollen carina in form of inverted $V$; mandibular notch close to mandibular base; mandibular apex more or less hooked apically (Fig. 13a, b); pronotum simple; mesopleuron strongly expanded into wing-like process (Fig. I4); foretrochanteral venter entire; forecoxa: venter simple, apex with long process (Fig. 14); Burkina Faso to Niger and Congo.
attentatus Turner, p. 26
- Clypeus (Figs. 61; 62; 63a, b): free margin deeply emarginate laterally, emargination attaining frontoclypeal suture in frontal view, outer side of emargination expanded into long, narrow process, middle section in most specimens with lamella; mandibular notch at mandibular midlength; mandibular apex simple; pronotal precollar transversely carinate: mesopleuron simple: foretrochanteral vemter notched; forecoxa: venter with process of varying size (Fig. 63 d , e), apex not expanded; Kenya to Namibia and Natal.
lamellatus Turner, p. 74

14. Clypeal lobe emarginate mesally (Fig. 56d, e); southern India, Sri Lanka.

Incisus sp. n., p. 68

- Clypeal lobe not emarganate. 15

15. Vertex setae erect. 16

- Vertex setae appressed. 17

16. Frons, vertex, and thorax coarsely sculptured; vertex setae about twice as Iong as midocellar diameter; scutal setae erect.
neaver Arnold, p. 97

- Head and thorax finely sculptured; vertex setae about as long as midocellar diameter (about as in Fig. 133d); scutal setae appressed. turnerl Arnold, p. 150

17. Setae of sterna III and IV visibly longer than those of sternum II.

- Setae of sterna III and IV no longer or insignificantly longer than those on sternum II (sterna largely glabrous in praos).

18. Clypeus and gaster black. 19

- Clypeus all or partly yellow and or gaster all or partly red.

20
19. Volsella: Fig. I16(I); Senegal to Transvaal.
swalei R. Turner, p. 132

- Volsella: Fig. Il 8 h ; Senegal, Mali.
slmander sp. n.. p. 136

20. Setae of sterna III and IV about as long as midocellar diameter, not concealing integument: scutal flange evenly curved or slightly expanded along tegula and contrastingly concave near scutal hindcorner (as in Fig. 3b); Madagascar.

- Setae of sterna III and IV several times the length of midocellar diameter. concealing integument; scutal flange evenly curved throughout (as in Fig. 3a).

21. Clypeal lobe obtusely tridentate (Fig. 69i).
madecassus (Kohl), p. 85

- Clypeal lobe somewhat irregularly rounded but not tridentate (Fig. 15le).
zoyphion sp. n., p. 169

22. Clypeal lobe without angulate corners, free margin forming single curved line with rest of clypeal margin (Figs. $78 \mathrm{f}-\mathrm{h}$; 123d); sterna I11 and IV not depressed, with fimbriae that extend along entire sternal width (but long fimbriae absent laterally in some moricei from Oman).

- Clypeal lobe with well-defined corners (Figs. 102d; 145e); sterna III and IV shallowly depressed mesally, depressions fimbriate (as in Fig. 143c).

23. Hindfemur and all tibiae with yellow markings; clypeal lobe obtusely pointed (Fig. 78f, g) in most specimens, but sharply so in some (Fig. 78h). moricei E. Saunders, p. 92

- Hindfemur and all tibiae without yellow markings; clypeal lobe acutely pointed (Fig. 123d). thoth sp. n., p. 137

24. Clypeus black laterally, lobe narrower (distance between lobe corners $1.6 \times$ distance between corner and orbit), lobe corners less prominent (Fig. 145e); postocellar impression deep: inner mandibular margin with prominent tooth; sterna III and IV each with subapical, nearly erect fringe; length 7.0-9.0 mm; Sri Lanka to western Pakistan (Sind, Punjab).
wroughtomi Cameron, p. 163

- Clypeus all yellow, lobe wider (distance between lobe corners $2.0 \times$ distance between corner and orbit), lobe corners more prominent (Fig. 102d); postocellar impression shallow; inner mandibular margin with no tooth; sternal setae nearly appressed: length $5.5-6.0 \mathrm{~mm}$; Burkina Faso to Kenya and Namibia, Arabian Peninsula north to Israel, and Pakistan (Baluchistan).
sanctus Pulawski, p. 119

25. Gaster red basally and with yellow markings, at least apically26

- Gaster without yellow markings except markings present in many unicolor in which gaster is all or largely black.

26. Free margin of clypeal lobe evenly arcuate (Fig. 54e). hombori sp. n., p. 67

- Free margin of clypeal lobe at least with small, median point.

27
27. Free margin of clypeal lobe roundly arcuate except for small, apical projection that is poorly defined in some specimens (Fig. 67d. e); West Africa.
hucidus sp. n.. p. 81

- Free margin of clypeal lobe sharply pointed (Figs. 23g. h; 148h-j); southern Africa.

28. Forecoxal venter flat or insignificantly convex: inner claws of mid- and hindtarsus slightly smaller than outer claws: flagellum black.
braunsi Arnold, p. 35

- Forecoxal venter very shallowly concave except slightly swollen along foremargin; inner claws of all tarsi as large as outer claws; flagellum in most specimens partly yellow to yellowish brown.
xanthophlus sp. n., p. 166

29. Clypeal lobe pointed mesally, not angulate laterally, its free margin forming single curved line with sides of clypeal margin (e.g., Fig. 35f).

30

- Clypeal lobe either angulate laterally or, if not, with
roundly arcuate free margin (e.g. Figs. 16a: 20d, e; 32c, $95 \mathrm{~d}, \mathrm{e})$.

43
30. Lateral scutal margin not upturned into flange along tegula, expanded adjacent to tegula and contrastingly concave between expansion and hindcorner (Figs. 3b; 36b, d).

- Lateral scutal margin upturned into flange (Fig. 3a), evenly curved throughout.

31. Lateral scutal portion conspicuously swollen and largely expanding over tegula, longitudinally depressed along swelling (Fig. 36b-d).
eremicus sp. n., p. 49

- Scutum not or minimally swollen laterally, slightly to moderately expanding over tegula, not or minimally depressed laterally.

32. Scutum only slightly expanding over tegula (Fig. 3b): bottom of foretrochanteral notch not broadened distally (Fig. 129a, b).
truncatus sp. n.. p. 144

- Scutum moderately expanding over tegula: bottom of foretrochanteral notch broadened distally (Fig. 121a, b). temporalis de Beaumont, p. 137

33. Middle clypeal section all or partly yellow. 34

- Middle clypeal section black.

34. Gaster all red or apex brown: Namibia.
herero sp. n., p. 64

- Gaster all black or with narrow red areas, with yellow markings in many umicolor.

35. Inner claws of mid- and hindtarsi slightly smaller than outer claws and tergum I black basally; length $4.6-6.5 \mathrm{~mm}$. unicolor Arnold, p. 151

- Inner claws of all tarsi as large as outer claws, slightly smaller in largest pratensis ( 8 mm long) in which tergum I is red basally.

36. Clypeus black basally: femora red and black, without yellow; bottom of foretrochanteral notch glabrous; Namibia. Zimbabwe. pratensis Arnold, p. 106

- Clypeus all yellow; femora with yellow apical spots, bottom of foretrochanteral notch with microscopic setae; Senegal, Mali.
lepidus sp. n.. p. 81

37. Setae erect adjacent to oral fossa, about one midocellar diameter long; propodeal hindface shiny, with well-defined punctures (which are markedly larger than those on gena adjacent to orbit); Oriental.
rothney Cameron, p. 114

- Setae nearly appressed adjacent to oral fossa, shorter than midocellar diameter: propodeal hindface dull, without well-defined punctures (except laterally in fluviatilis). 38

38. Sterna II-VI with preapical rows of conspicuously erect setae (Fig. 75f); South Africa to Namibia and Zimbabwe. modestus Arnold. p. 90

- Erect sternal setae inconspicuous.

39. Sternum VIII deeply emarginate apically (Fig. I32a); Namibia. tuberculatus sp. n., p. 146

- Sternum VIll rounded to shallowly emarginate. 40

40. Sides of propodeal dorsum and of propodeal hindface shiny, with well-defined punctures, which are markedly larger than genal punctures adjacent to orbit.
fluwatilis Arnold, p. 57

- Propodeum dull, without well-defined punctures or with punctures similar in size to those on gena adjacent to orbit.

41. Gaster red basally; Senegal to Burkina Faso.
bambara sp.n., p. 31

- Gaster all black

42. Inner claws of mid- and hindtarsi slightly smaller than outer claws; mandible with evanescent abductor ridge; southern Africa.
pulchellus Arnold, p. 109

- Claws of each pair equal in size; mandible without abductor ridge; West Africa to Pakistan.
sabulosus sp. n., p. 116

43. Many mesothoracic punctures more than one diameter apart, interspaces shiny; forebasitarsus without rake spines; punctures of sterna III and IV several to many diameters apart mesally but nearly contiguous laterally: West Africa.
punctatus sp. n., p. 112

- Mesothoracic punctures no more than one diameter apart. interspaces dull; forebasitarsus with rake spines except in some funereus and some swalei, in which all sterna are uniformly, densely punctate (punctures almost contiguous).

44. Free margin of clypeal lobe evenly arcuate to obtusely pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin (Figs. 16a; 20d, e).

- Free margin of clypeal lobe angulate laterally (e.g., Figs. 38c; 88a, b: 139a, b), with median tooth in some species (Figs. 108c; 126d).

45. Face broader in front view and clypeal lobe unusually short (Fig. 20d, e): antennal sockets separated by about $1.8 \times$ socket diameter, clypeal midlength about $1.2 \times$ distance between sockets; gaster largely red, mid- and hindtarsal dorsum dark brown; Mali, Senegal.
baobabicus sp. n., p. 33

- Face narrower and clypeal lobe longer: antennal sockets separated by $1.0-1.4 \times$ socket diameter, clypeal midlength $1.4-2.0 \times$ distance between sockets: coloration different except in some karooensis (which occurs south of the equator). 46

46. Scapal venter all or largely yellow; tarsi yellow. 47

- Scapal venter black, translucent apically. 49

47. Clypeal lobe broadly arcuate (Fig. 16a); scutal flange minimally expanded opposite tegular midlength and concave between expansion and hindcorner; bottom of foretrochanteral notch setose (Fig. 17a, b); femora black (yellow apically): Sri Lanka. $a=1$ x sp. n., p. 29 Clypeal lobe roundly pointed (Fig. 32c); scutal llange evenly curved; bottom of foretrochanteral notch setose or glabrous: at least hindfemur red (yellow apically); West Africa to Uzbekistan and northern India.
48. Fagellum yellow at least ventrally, all yellow in many specımens: rake spines of forebasitarsus no longer than basitarsus width; West Africa to Uzbekistan and northwest India.
electus Nurse, p. 46

- Flagellum black, dark brown ventrally: longest rake spine of forebasitarsus 1.2-1.7 $\times$ apical width of basitarsus; Senegal and Malı. senegalensis Arnold, p. 122

49. Rake spines of forebasitarsuseither absent or shorter than basitarsus width; scape and gaster black; Morocco to India.
funereus Gussakovskij, p. 60 Rake spines of forebasitarsus longer than basitarsus width.
50. Clypeal lobe more pointed (Fig. 27d); trochanteral notch with row of erect microsetae (Fig. 28a, b); gaster red basally.
chalcithorar Arnold, p. 40

- Clypeal lobe more rounded (Fig. 57c); foretrochanteral notch in most specimens without row of erect setae (Fig. 58a, b); gaster black to red. karooensis Brauns, p. 71

51. Clypeus all or largely yellow. lobe corner prominent (Fig. 139a, b); postspiracular carina in most specimens expanded into rounded lamella that partly covers subalar fossa (as in Fig. 140a, b); length $4.0-4.5 \mathrm{~mm}$. Mali and Ghana to Arabian Peninsula, Pakistan and Sri Lanka. vedda Pulawski, p. 154

- Clypeus black; lobe corner not prominent; postspiracular carina not expanded; body in many specimens longer than 4.5 mm .

52. Foretrochanter not emarginate; clypeal lobe characteristically truncate (Fig. 88a, b); Congo.
praos sp. n., p. 104

- Foretrochanter emarginate; clypeus different. 53

53. Free margin of clypeal lobe evenly arcuate mesally or nearly so, without median projection (Figs. 38c; $110 \mathrm{e}, \mathrm{f}$; $114 \mathrm{~d}, \mathrm{e})$; Afrotropical.

- Clypeal lobe with median projection: free margin convex mesally and concave laterally (Figs. 108c; 126d); Oriental.

54. Scutal flange evenly curved throughout (as in Fig. 3a); foretrochanteral notch with row of conspicuous, semierect microsetae (Fig. 39d, e): length of hindtarsomere 111 about $1.3 \times$ apical width (Fig. 39b, c); gaster in many specimens red basally.
eurypus sp. n., p. 53

- Scutal flange slightly expanded near tegular midlength and concave between expansion and scutal hindcorner (as in Fig. 3b); foretrochanteral notch without such row of setae; length of hindtarsomere 111 about $1.8 \times$ apical width; gaster black.

55. Clypeal lobe: distance between corners slightly more (1.1$1.2 \times$ ) than distance between corner and orbit (Fig. 110 f ); foretrochanteral notch shallow, not clearly delimited distally (Fig. 111a); mesopleural punctures well-defined, in most specimens not obscured by vestiture; South Africa north to Namibia and Zımbabwe.
simplex Arnold, p. 128

- Clypeal lobe: distance between corners markedly (1.6$2.1 \times$ ) more than distance between corner and orbit; foretrochanter notch deep, sharply delimited apically (Fig. 115b); mesopleural punctures ill-defined, largely obscured by vestiture.

56. Free margin of clypeal lobe sinuate, distance between corners about $1.6 \times$ distance between corner and orbit (Fig. 152a); tarsi black; occipital carina joining hypostomal carina. Zambia.
zyx sp. n., p. 170

- Free margin of clypeal lobe arcuate, distance between corners 2.0-2.1 $\times$ distance between corner and orbit (Fig. 114e); tarsi yellow; occipital carina effaced before joining hypostomal carina; Senegal to Central African Republic and Gabon.
sobrmus sp. n., p. 130

57. Scutal flange evenly curved throughout (as in Fig. 3a); midbasitarsus straight; sterna with impunctate, shiny apical depressions; gaster black; India to Thailand.
siamensis Tsuneki, p. 126

- Scutal flange slightly convex along tegula and contrastingly concave near to scutal hindcorner (as in Fig. 3b); midbasitarsus bent (Fig. 126e): sterna uniformly punctate throughout; gaster red basally; southern India, Sri Lanka.
tissa Pulawski, p. 139


## Descriptions of Species

The species are arranged alphabetically.

## Gastrosericus ammochares sp. n.

(Figures 8, 9)
Derivation of Name.-Ammochares is derived from two Greek words: ammos, sand, and khairo, to enjoy, a sand lover, a noun in apposition to the generic name; with reference to the habitat in which specimens were collected.

Diagnosis. - The female of ammochares (male unknown) can be recognized by its unique clypeal lobe: the central portion is produced into a secondary lobe, an essentially rectangular plate whose corners are markedly closer to each other than to orbit and which is separated from the lobe corner by a small but welldefined emargination (Fig. 8a, b). In addition, the anteromedian portion of the forecoxa is concave and glabrous, delimited laterally by a triangular prominence; and the posterior mandibular margin is concave between the condyle and the apex of the condylar ridge (Fig. 8e). Like eremicus, temporalis, and truncatus, ammochares has a characteristic scutum whose lateral margin, gradually rising but not upturned into a flange, is expanded over the tegula (markedly so in eremicus. slightly in the other three) and contrastingly concave near the hindcorner (as in Fig. 3b). Other recognition features in the females are: gena conspicuously dentate, pronotal side sulcate, inner mandibular margin without basal tooth or cleft. and vertex broad (distance between hindocellar scar and orbit $2.0 \times$ or more scar length).

DESCRIPTION (based on female only).-Mandible with notched posterior margin, abductor ridge absent (Fig. 8e). Labrum: free margin broadly, shallowly emarginate. Orbit closer to antennal socket than to hindocellus. Propleuron simple. Thoracic punctation fine, scutal punctures barely discernible. Lateral scutal margin not upturned into flange, somewhat expanded over tegula, contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin $3.3 \times$ apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed, including propodeal setae and those adjacent to oral fossa; obscuring mesopleural integument.

Head black, but mandible (except apex) yellow, scapal venter reddish, flagellum brown or reddish (largely so in some specimens): clypeus varying from all yellow to largely black, red mesally in some specimens. Thorax red or largely black (only prothorax, mesothoracic venter and metapleuron red); pronotal lobe, tegula, and humeral plate pale yellow. Gaster red. Femora red, pale yellow apically (yellow spots longer ventrally than dorsally, largest on forefemur). Tibiae pale yellow, red ventrally except all yellow basally and distally. Tarsi pale yellow. Wings hyaline.
8. - Mandible (Fig. 8d, e): inner margin with no basal tooth, cleft, or preapical tooth; posterior margin concave between condyle and apex of condylar ridge; distal portion of adductor ridge not expanded, thus posterior margin stepped rather than notched. Clypeus (Fig. 8a, b): disk without teeth or carinae; lobe emar-
ginate adjacent to corner (which is well defined), mesally expanded into rectangular plate whose distal margin is emarginate; plate corner angulate (distance between plate corners about 0.5 $x$ distance between corner and orbit); lobe corners separated by a distance that is about $0.9 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $2.0 \times$ scar length. Gena conspicuously dentate at level of mandibular base (Fig. 8c). Flagellomere I: dorsal length $1.7 \times$ apical width. Pronotum: precollar carinate laterally, side sulcate. Forecoxa conspicuously concave along admedian margin (except apically); concavity glabrous, widening anterad (anterior width about $0.3 \times$ coxal foremargin), delimited laterally by triangular, longitudinal expansion. Forebasitarsus with 5-7 rake spines; length of apical spine about $2.0 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine about $0.5-07 \times$ apical width of tarsomere. Venter of tarsomeres $V$ with no preapical spines. Sternum II setose throughout, without apicomesal, glabrous area. Pygidial plate with thin, inconspicuous setae except for several stout apical setae. Length $4.5-5.0 \mathrm{~mm}$.

ס. - Unknown.
Geographic Distribution (Fig. 9) - Gao area of Mali.
Records. - Holotype: \&, MALt: Gao, 14 Aug 1991, WJP (CAS). Paratypes: MALI 10 km N Gao, 15 Aug 1991, MS (29. CAS. MS) and WJP (2 \& CAS); 30 km W Gao, 15 Aug 1991, MS (19, MS): 180 km SW Gao, 13 Aug 1991, MS (28. MS).

## Gastrosericus asilivorus Pulawski

(Figures 10, 11)
Gastrosericus ashivorus Pulawskı in Krombeın and Pulawskı, 1986:17, 8. Holotype: \&, Srı Lanka: Trincomalee Disirict: Trincomalee, China Bay Ridge Bungalow (USNM), examined. - Krombern $m$ Krombern and Pulawski, 1986:5 (life histors).
DiAgnosis. - The female of asilivorts (male unknown) can be recognized by the particular shape of the clypeus (Fig. 10a, b) and also by the golden frontal vestiture.

Description (based on female only).-Mandible: posterior margin notched, abductor ridge vestigial. Labrum: free margin broadly, conspicuously emarginate. Orbit closer to hindocellar scar than to antennal socket. Propleuron simple. Thorax and vertex micropunctate. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 4.0-4.6 $\times$ apical truncation. Recurrent veins separate.

Vestiture appressed, including setae adjacent to oral fossa. nearly appressed at propodeal hindcorners; nearly obscuring mesopleural integument.

Head black, including scape; clypeal middle section largely yellow in one specimen examined. Mandible yellow, black apically. Thorax black, pronotal lobe yellow posteriorly. Gaster black. Femora black, narrowly yellow apically, fore- and midfemora yellow apicoventrally on about a quarter to a third of femoral length. Foretibia brown, yellow on outer side; mid- and hindtibia yellow dorsally. Tarsi brown. Wings slightly infumate. Frontal vestiture golden.
9.- Mandible (Fig. 10d): inner margin with one subbasal tooth, without cleft or preapical tooth. Clypeus (Fig. 10a, b): disk with a pair of preapical teeth (Fig. 10c); free margin emarginate on each side of median portion (whose free margin is arcuate), corner well-defined. Gena with prominent footh at level of mandibular base (Fig. 10e). Flagellomere I: dorsal length $1.6 \times$ apical width. Pronotum: precollar not carinate laterally, side deeply

 head laterally ( 0 (0)
sulcate. Forecoxa concave admesally. Forebasitarsus with 6 rake spines; length of apical spine equal to apical width of basitarsus. Foretarsomere IV: inner apical spine about equal to apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum II pubescent throughout. Setae of pygidial plate thin. inconspicuous anteriorly, stout on apical half (Fig. 101). Length $8.5-9.0 \mathrm{~mm}$.
3.-Unknown.

Geographic Distribution (Fig, 11). - Sri Lanka,
Records - SR1 LANKA: Monaragala District Mau Aru 10 mı EUda Walawe (1), (AS). Trincnmalee District: Trincomalee, Chona Bay Ridge Bungalow (1 \%. [ISNM)

## Gastrosericus attenuatus Turner

(Figures 12-15)
 (BMNH). cxamuned. - Amold. 1922.123 (original descripuon copied). 1930:2 (1nted). Bohart and Menke. 1976:256 (Isted).

Diagnosis. - The female of attenuatus shares with lamellatus he following unique combination of characters: mandible, scape,
and flagellomere I unusually long; vertex narrow; pygidial plate fully asetose: and gaster black (distance between acetabulum and mandibular apex $4.8 \times$ basal mandibular width, distance between hindocellar scar and orbit equal to midocellar diameter, length of flagellomere I 2.2-2.6 $\times$ apical width). Unlike lamellatus. attenuatus has a broadly arcuate clypeal lobe (Fig. 12a), a cleft on the inner mandibular margin (Fig. 12c), and the pygidial plate is sparsely punctate (in lamellatus, the clypeal lobe is sinuate, the mandible has no cleft, and the pygidial plate is impunctate). The presence, in some attemuatus, of an inverted V-shaped carina on the clypeal disk (Fig. 12b) is also diagnostic.

The male of attemuatus is unique in having a grotesque, apically more or less hooked mandible (Fig. 13a, b), a clypeus with a reverted V-shaped swelling (Fig. 13a-c), a laterally expanded mesopleuron (Fig. 14), and the forecoxa with a conspicuous apical process (Fig. 14). The shiny, sparsely punctate pygidial plate and largely glabrous sterna II-VI are shared only with the male of lamellatus, and the non-notched trochanteral venter is another subsidiary recognition feature.

Description. - Mandible elongate, distance between acetabulum and apex 4.8-5.0 $\times$ basal width; posterior margin notched,

abductor ridge absent. Labrum: free margin minimally concave in female, notched in male. Orbit closer to hindocellar scar than to antennal socket. Propleuron simple. Scutal punctures fine but well-defined. Scutal flange slightly expanded adjacent to tegula, contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin 3.4-4.2 $\times$ apical truncation. Recurrent veins separate or interstitial above.

Setae appressed adjacent to oral fossa and on thorax (nearly appressed between propodeal side and hindface), totally obscuring mesopleural integument; vertex setae appressed except, in female, a few setae erect, about as long as midocellar diameter.

Head black, including scape, but mandible brownish yellow,
dark apically. Thorax black, but pronotal lobe posteriorly, tegula, and humeral plate pale yellow. Gaster black. Femora black, pale yellow apically. Tibiae black (brown in female from Niger). pale yellow dorsally or (foretibia) on outer side. Tarsi brown, mid- and hindbasitarsus yellow in most specimens. Wings weakly infumate.

ㅇ.-Mandible: unusually long (Fig. 12c); inner margin with basal tooth and cleft but without preapical tooth. Clypeus (Fig. 12a, b): disk in most specimens with obtuse carina in form of reversed $V$ (carinae concealed by vestiture); free margin weakly, irregularly arcuate, almost straight, corner well-defined; distance between comers $5.2-5.5 \times$ distance between comer and orbil.

 30). t. pygidal plate ( $\times$ So)

Head wide, distance between antennal sockets about $2.0 \times$ socket diameter. Distance between hindocellar sear and orbit about $0.5 \times$ scar length and about equal to midocellar diameter. Gena simple. Flagellomere 1: dorsal length 2.2-2.6 $\times$ apical width. Pronotum: precollar not carınate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 rake spines $(6$ in some specımens); length of apical spıne $1.1-1.3 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 1.5$1.8 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum Il largely glabrous (setose basally and laterally). Pygidial plate asetose, sparsely punctate. Length 7.59.0 mm .
8.-Mandible (Fig. 13a, b): unusually long, markedly bent near base, with hooked apex (slightly so in small specimens): inner margin with subbasal tooth, posterior margin near base nearly straight to markedly convex. Clypeus (Fig. 13a-c) with narrow, glabrous area along free margin (except setose near midline): area concave, sharply delimited; lobe ill-defined, but middle section with conspicuous, thick carina in form of reverted l concave between two branches of carina. Head wide, distance
between antennal sockets about 2.0-2.2 $\times$ socket diameter. Distance between hindocellar scar and orbit about $1.8 \times$ scar length. Flagellomere 1: dorsal length 2.2-2.7 $\times$ apical width. Mesothoracic venter concave, with raised longitudinal carina, expanded laterally into large, wing-like process (Fig. 14). Forecoxa with conspicuous apical process (Fig. 14). Foretrochanter not notched. Forebasitarsus with 5 or 6 rake spines; longest spine 1.4-1.5 $\times$ apical width of basitarsus. Dorsum of mid- and hindbasitarsus with two preapical spines each. Inner claws of all tarsi as large as outer claws. Pygidial plate shiny, sparsely punctate. Sterna without mesal depressions, sterna III-V (except laterally) with punctures that are several to many diameters apart; sterna IIVI largely glabrous. Sternum VIll rounded apically. Volsella: Fig. 13a, b). Length $7.0-7.5 \mathrm{~mm}$.

Habitat. - In Togo, I collected specimens in a drying river bed. A lemale and a male were resting motionless on damp sand, while another female and male were searching between cracks of a clay crust that overlaid the sandy substrate.

Geographic Distribution (Fig. 15).-Equatorial and subequatorial West Africa.


Figure 11 Collecting locahbes of Gastrosericus asthorws and azva

Records.-BURKINA FASO: Gourma Komplenga 20 km S Pama (5 \&, $4 \%$ CAS, 128.6 8. LEM)

CAMEROON Djafga at Lagone shore, $10^{\circ} 37{ }^{\prime} \mathrm{N}, 15^{\circ} 09^{\prime} \mathrm{E}$ (1 §, FSAG).
CONGO: Dıoué 17 km W Brazzavılle (28.1 ס, AAM, 28. CAS).
GHANA: Volia River (18. BMNH, holotype of aftenuatus), NIGER: Niamey (I 8, KMG).
NIGERIA: southern Nigena: no specific locality ( $18, \mathrm{BMNH}$ ).
TOGO: Sokodé ( 1 万, CAS; 1 \&. FSAG), 12 km N Sokodé (28. 2 3, CAS).

## Gastrosericus azyx sp. n.

(Figures 11, 16, 17)
Derivation of Name. - Azy is a Greek word meaning unyoked, unwedded, solitary (the female of this species is unknown).

Diagnosis. - The male of $a z y x$ has appressed vestiture, the free margin of the clypeal lobe is markedly, roundly arcuate and not angulate laterally (Fig. 16a), the foretrochanteral notch is deep, and sternal pubescence is short, uniform. Other species are similar (chalcithorax, electus, funereus, karooensis, senegalensis), but azyx has a unique color combination: the scape is partly yellow and the hindfemur nearly all black (narrowly yellow apically). Additional recognition features are: scutal flange


Figure 12. Gawronericus alfonikatus, Female: a, noncamnate clypeus $(x 44)$. b, cannate clypeus ( $\times 44$ ) $c$ c, mandible $(\times 41$ ).
somewhat expanded over tegula and contrastingly concave between expansion and scutal hindcorner, longest spine of forebasitarsus about $1.3 \times$ apical width of basitarsus, and gaster red basally.
Relationship to Gastrosericus Tissa.-Gastrosericus azln, known only from the male, is similar morphologically to tissa except in the sexually dimorphic characters. Both species occur in Sri Lanka. However, $a z y$ is not likely to be the male of tissa because of its partly yellow scape and yellow tarsi. In both sexes of tissa, the scape is black and the tarsi are dark brown.

DESCRIPTION (based on male only).-Mandible with notched posterior margin, abductor ridge absent. Labrum: free margin minimally concave, almost straight. Orbit slightly closer to hindocellar scar than to antennal socket. Propleuron simple. Thorax finely sculptured, scutal punctures ill-defined. Scutal flange slightly expanded adjacent to tegula, contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin $4.0-4.6 \times$ apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed, including setae adjacent to oral fossa; nearly appressed between propodeal side and hindface; obscuring mesopleural integument.

Head and thorax mostly black, but the following are pale yellow: mandible (except apically), scapal venter (all or distal half) and scapal apex, pronotal lobe posteriorly, tegula, and humeral plate anteriorly. Flagellum black to yellow brown ventrally. Gastral segments I and II as well as sternum III red.

 whella dorsally ( 204$)$
remainder dark brown. Femora black, pale yellow apically. Tibiae pale yellow, red to dark brown ventrally. Tarsi pale yellow, mid- and hindtarsal apex yellowish brown. Wings hyaline.

## ९. - Unknown.

§. - Mandible: inner margin without basal tooth. Clypeus (Fig. 16a): free margin of lobe arcuate, not angulate laterally, forming single curved line with rest of clypeal margin. Dorsal length of flagellomere I 1.1-1.2 $\times$ apical width. Distance between hindocellar scar and orbit about equal to scar length. Foretrochanteral notch not clearly delimited distally, about as long as distance that separates it from trochanteral apex (Fig. 17a), its bottom evenly setose (Fig. 17b). Forebasitarsus with 3 or 4 rake spines; longest spine $1.3 \times$ apical width of basitarsus. Dorsum of midbasitarsus with one or no preapical spine, dorsum of hindbasitarsus without such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIIl rounded apically. Volsella: Fig. 16b. Length 4.4-5.5 mm.

## Geographic Distribution (Fig. 11).-Sri Lanka.

Records. - Holotype: ${ }^{\text {on, SRI LANKA. Mannar District: Ma Villu, 17-21 Feb }}$ 1979, KVK, T. Wijesinhe, S. Sinwardane, T. Gunawardane (USNM). Paraypes: SRI LANKA: Colombo District: Pamunugama, 16 Mar 1981, KVK, T. Wijesinhe. L. Weeratunge ( 18 CAS). Mannar District Manchchukkaddı, 25 Jan 1978. collector's name not indicated, but the handwriting is that of $\mathbf{P}$. B. Karunaratne (2 8, CAS, NMC).

## Gastrosericus bambara sp. n.

(Figures 9. 18. 19)
Derivation of Name. - Bambara, the largest ethnic group of Mali; a noun in apposition to the generic name.
Diagnosis. - The female of bambara has a distinctive clypeus (Fig. 18a, b): the lobe free margin is essentially sinuate (i.e., convex mesally and concave laterally) except angulate midway from the midpoint to corner. Other recognition features are: gena with a tooth (Fig. I8d), pronotal side deeply sulcate, and forecoxa concave anteromesally.

In the male, the setae are appressed between the mandibular base and occipital carina and on the vertex, the clypeus is all black with an acutely pointed lobe, and the gaster is red basally. Males of modestus and most tuberculatus are similar, but in bambara the erect sternal setae are inconspicuous and sternum VIIl is rounded apically (conspicuous rows of erect sternal setae present in modestus, Fig. 75f, sternum VIII deeply emarginate in tuberculatus. Fig. 132a).

Description. - Mandible: posterior margin notched, abductor ridge present (obtuse or evanescent in male). Labrum: free margin acutely emarginate. Orbit closer to hindocellar scar than to antennal socket in female, equidistant in male. Propleuron simple. Thorax finely sculptured, but individual punctures discernible on scutum. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.2-5.0 $\times$ apical truncation. Recurrent veins separate.

Setae appressed on head and thorax including those adjacent to oral fossa, but semierect between propodeal side and hindface; obscuring mesopleural integument.

Head black but mandible pale yellow (except apically): scape yellow apically, venter black in female, all or largely yellow in male. Thorax black except pronotal lobe posteriorly, tegula, and


Figure 14 Giastrosericus attcmuatus, male: base of forelegs and mesothoracic venter ( $\times 47$ )
humeral plate pale yellow. Gastral segments I and II red (only I in some males), remainder black. Femora black (female hindfemur largely red), each with pale yellow apical spot that is longer ventrally than dorsally. Tibiae pale yellow, reddish brown ventrally or (foretibia) on inner side. Tarsi yellow or brown. Wings hyaline.
9.-Mandible (Fig. 18c): inner margin with subbasal tooth and broadly arcuate cleft, but without preapical tooth. Clypeus (Fig. 18a, b): disk without teeth or median carinae but raised along midline; free margin of lobe markedly sinuate except angulate midway from midpoint to corner, which is well-defined: distance between corners $2.4 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $1.0 \times$ scar length. Gena with large tooth at the level of mandibular base and adjacent to occipital carina (Fig. 18d). Flagellomere 1: dorsal length $1.4 \times$ apical width. Pronotum: precollar carinate laterally, side deeply sulcate. Forecoxa concave anteromesally, foremargin expanded into a transverse looth. Forebasitarsus with 4 or 5 rake spines: length of apical spine $1.0 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine $0.2-0.3 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum Il pubescent throughout. Pygidial plate punctate, with inconspicuous setae except setae stout on apical quarter or so (Fig. 18e). Length $7.5-8.8 \mathrm{~mm}$.
8. - Mandible: inner margin obtusely angulate but without tooth. Clypeus: free margin of lobe sharply pointed, not angulate laterally, forming single curved line with rest of clypeal margin.


Figure 15 Collecting localites of ciavtrosermes attentuatis and lumelhaths

Distance between hindoceltar scar and orbit about $1.4 \times$ scar length. Flagellomere I: dorsal length $1.2 \times$ apical width. Foretrochanteral notch shorter than distance that separates it from trochanteral apex (Fig. 19), notch bottom uniformly covered with appressed setac. Forebasitarsus with 3 rake spines; longest spine about equal to apical width of basitarsus. Dorsum of midand hindbasitarsus without preapical spines. Inner claws of all larsi as large as outer claws. Pygidial plate densely punctate. Sterna without median depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII rounded apically. Volsella: Fig. 18f. Length $4.8-6.0 \mathrm{~mm}$.

Geggraphic Distribution (Fig. 9). - Senegal to Burkina Faso.

Records.-Holotype: 9, MALI 30 km NE San. 6 Aug 1991, WJP (CAS). Paratypes: BURKINA FASO: Bobo Dioulasso, 6 Oct 1967, J. Hamon (1 8, MNHN) and 29 Sep 1979. AP ( 1 8. FSAG, head and prothorav missing); Boboville near Bobo Dioulasso, 3 May 1968, J Hamon (1 \%, MNHN): 5 km E Boromo at Volta Norre, 18 Oct 1979, AP ( 1 太, FSAG), Gourma Komplenga 20 km S Pama, 1-16 Jun 1988. Sanborne, Landry, and Tou (28, CAS, LEM).

MAL1: Mourdiah, 25-31 Aug and 25 Aug-5 Sep 1986. M. Mathews (2 9, BMNH): 5 km S San, 3 Aug 1991, MS (18, 1 f, MS) and WJP (1 8, CAS); same localry bul 22 Aug 1991, WJP (4 8, CAS); 30 km S San, 5 Aug 1991, MS (28.1 of, MS ) and WJP ( 1 s, CAS); 50 km S San, 4 Aug 1991, MS (18, MS); 100 km NE San. 21 Aug 1991, WJP (1 5, CAS), 40 km W Ségou, 31 Jul 1991, WJP (19. CAS).

SENEGAL. Kopgoyane in Forêt de Bandia, circa 20 kmi S Thiès, 16 Sep 1969. J Hamon (1 f, MNHN), 7 km SW Thès, 8 Jul 1991, WJP (2 8, CAS).


Figure 16. Gastrosericus azn, male: a. clypeus $(\times 44)$; b, volsella $(\times 233)$

## Gastrosericus baobabicus sp. n.

(Figures 20-22)
Derivation of Name. - Baobabicus, a newly coined Neolatin masculine adjective derived from baobab, an African tree. These trees were present near the collecting sites.

Diagnosis. - The female of baobabicus is unique in having an unusually long mandible (Fig. 20c) combined with a largely red gaster (distance between acetabulum and mandibular apex $4.7 \times$ basal mandibular width). The antennae are further apart than in any other Gastrosericus, the antennal sockets being separated by a distance equal to about $2.5 \times$ socket diameter (Fig. 20a, b), although attenuatus, madecassus and zoyphion approach this condition (ratio about 2:1). In many specimens, the hindleg coloration is also diagnostic: femur red but tarsus contrastingly dark.

In the male, the genal and thoracic vestiture is short, appressed; the free margin of the clypeal lobe broadly arcuate and not angulate laterally (Fig. 20d); the sternal setae are short, uniform; and the gaster is red. Several other Gastrosericus share these characters ( $a=y x$, chalcithorax, electus, funereus, karooensis, and senegalensis), but the head of baobabicus is slightly wider (Fig. 20d, e) and the clypeal lobe less prominent: the antennal sockets are separated by about 1.8 socket diameter, and the clypeal midlength is about $1.2 \times$ the distance between sockets (rather than 1.4-1.5 and 1.4-1.7, respectively). The dark brown dorsum of the mid- and hindtarsi are a subsidiary diagnostic feature in combination with a red gaster.

Description. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin shallowly emarginate. Orbit closer to hindocellus than to antennal socket. Propleuron simple. Thorax finely sculptured, individual punctures barely discernible. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.2-4.1 $\times$ apical truncation. Recurrent veins interstitial above or forming a short petiole.

Vestiture appressed, including setae adjacent to oral fossa and those between propodeal side and hindface; mesopleural setae largely obscuring integument.

Head black (scapal venter translucent apically, partly yellow in some specimens), mandible yellow (except apically), clypeus yellow at least anteromesally (yellow color concealed by vestiture). Thorax black, but pronotal lobe, most of tegula, and humeral plate yellow. Gaster red, but tergum IV darkened in many females and terga IV and V darkened in most males. Legs: see below. Wings slightly infumate.


Figure 17. Gastrosericus azy*, male: a, foretrochanter ( $\times 207$ ), b, bottom of foretrochanteral notch ( $\times 620$ )

 temale $(=84), f$, volsella $(\times 270)$
8.- Mandible (Fig. 20c): elongate, distance between acetabulum and apex $4.7 \times$ basal width; inner margin with obtuse basal tooth and obtuse cleft, but no preapical tooth. Head transverse in frontal view (Fig. 20a), distance between antennal sock-
ets about $2.5 \times$ socket diameter. Clypeus (Fig. 20b): disk without teeth or carinae: free margin of lobe almost straight; distance between corners 7.3-7.5 $\times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $0.8 \times$ scar
length. Gena simple. Flagellomere I: dorsal length $2.2 \times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 3-5 rake spines; length of apical spine about $1.3 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine about $0.5 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum II apicomesally with glabrous, triangular area. Pygidial plate with thin, inconspicuous setae but one or two apical setae stout. Length $5.7-6.5 \mathrm{~mm}$.

Femora red, brown basally, forefemur largely brown. Tibiae red, hindtibial dorsum yellow. Foretarsus red, mid- and hindtarsi dark brown in specimens from Mali and Senegal; all tarsi red in single female from Burkina Faso.
d.-Mandible: inner margin with subbasal tooth. Clypeus (Fig. 20d, e): free margin of lobe broadly arcuate, corners rounded; distance between corners about $2.6 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about equal to scar length. Flagellomere 1 : dorsal length $1.3 \times$ apical width. Foretrochanteral notch longer than distance that separates it from trochanteral apex (Fig. 21a), bottom glabrous, margined by row of erect setae on each side (Fig. 21b). Forebasitarsus with 3 or 4 rake spines; longest spine $1.2 \times$ apical width of basitarsus. Dorsum of midbasitarsus with one or two preapical spines, dorsum of hindbasitarsus with one or two such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely setose. Sterna without depressions, microscopically, closely punctate, shortly, evenly setose. Sternum VIII rounded apically. Volsella: Fig. 20f. Length $4.5-5.6 \mathrm{~mm}$.

Forefemur black or largely red, yellow apically; midfemur red except black basally or dorsum and posterior side black; hindfemur red, black basally or black dorsally and ventrally; tibiae red, pale yellow dorsally (foretibia yellow on outer side); foretarsus yellow, midtarsus light brown, hindtarsus light brown ventrally and dark brown dorsally.

Geographic Distribution (Fig. 22).-Burkina Faso, Mali and Senegal.

Records.-Holotype: \&. SENEGAL: 3 km W Samba Dia $(=70$ alr km W Kaolack), 9 Jul 1991, WJP (CAS). Paratypes: BURKINA FASO: Gourma Kompienga 20 km S Pama, 1-16 Jun 1988, Sanbome, Landry, and Tou (18, LEM).

MALI: 10 km E Hombon, 18 Aug 1991, WJP (18, CAS); 40 km SE Ségou, 2 Aug 1991, WJP (1 8, CAS).

SENEGAL: 5 km SE Diourbel. 23-24 Jul 1991 . AM (38.6 8, AAM). WJP ( 6 ᄋ, 17 \%, CAS); 16 km N Fatick, 25 Jul 1991 , WJP ( 28.18, CAS), 3 km W Samba Dia, 9 Jul 1991, WJP ( 38.1 8, CAS); same localıty, 17 Jul 1991 , AM ( 18 8, AAM), WJP (28. CAS); same locality, 24 Jul 1991. AM (18, AAM).

## Gastrosericus braunsi Arnold

(Figures 9, 23, 24)
Gastrosericus Braunsi Arnold, 1922:124, 9,0 , incorrect onginal capitalization. Holotype: \&, Zımbabwe: Victoria Falls (SAM), examıned. - Arnold. 1930:2 (listed); Bohart and Menke, 1976:256 (listed).
Gastrosericus laticeps Amold, 1922:127, $\delta$. Holotype: f, Zımbabwe: Victona Falls (SAM), exammed. New synonym.-Arnold, 1930:2 (listed); Bohart and Menke, 1976:256 (listed).

Diagnosis. - The female of braunsi has a distinctive carina that joins the hypostomal carina anteriorly and expands into the genal tooth posteriorly (Fig. 23e), and the clypeal lobe is sinuate, longer mesally than in other species (Fig. 23a, b). In addition, most females have a yellow fascia on tergum V , a subsidiary recognition feature.

The male can be recognized by the unique combination of


Figure 19. Gastrosericus bamhara: male foretrochanter ( $\times$ 197).
the acutely pointed clypeus (Fig. 23g, h), apical terga marked with yellow, and the inner claws of mid- and hindtarsi slightly smaller than the outer claws.

Description. - Mandible: posterior margin notched, abductor ridge present (evanescent in some specimens). Labrum: free margin acutely emarginate. Orbit equidistant from antennal socket and hindocellar scar in female, but slightly closer to antennal socket than to hindocellar scar in male. Propleuron simple. Thorax microsculptured, without well-defined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 4.0-5.7 $\times$ apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed, except setae between propodeal side and hindface semierect, about as long as midocellar diameter; largely to completely obscuring mesopleural integument.

Head and thorax black, but the following are pale yellow: clypeus (except black basally or basomedially in female, also subapically in some females), mandible (except apically), scapal venter (only basally and apically or only apically in female), pronotal lobe, tegula, humeral plate. Gastral segment I, or 1 and II, or I-III largely red, remaining segments largely brown or black; apical depression all or partly yellow on tergum $V$ in most females (on terga III-V in some) and on male terga IV-VI; male tergum VIl brown or yellow. Wings hyaline.
9.- Mandible (Fig. 23d): inner margin with one subbasal tooth but without cleft or preapical tooth. Clypeus (Fig. 23a, b): disk without teeth or carinae, convex basomedially and shallowly concave apicomesally (Fig. 23c); free margin markedly sinuate (conspicuously prominent mesally), corner well-defined; distance between corners 3.0-3.5 $\times$ distance between corner and orbit. Distance between hindocellar scar and orbit 1.2-1.3 $\times$ scar length. Lower gena with additional carina that joins hypostomal carinae anteriorly and is expanded posteriorly into rounded or obtusely angulate genal tooth (Fig. 23e). Flagellomere I: dorsal length $1.7-1.8 \times$ apical width. Pronotum: precollar carinate laterally, side deeply sulcate. Forecoxa concave along inner margin, outer side of concavity expanded into oblong, prominent tooth (Fig. 23f). Forebasitarsus with 5 rake spines; length of apical spine 1.3-1.5 $\times$ apical width of basi-

 1forsclla( 3010$)$
tarsus. Foretarsomere 1 V: length of inner apical spine about 0.5 - apical width of tarsomere. Venter of tarsomere V without preapical spmes. Sternum 11 evenly pubescent throughout. Pygidial plate with thin, inconspicuous setae except 2-6 apical setae stout. Length $8.0-9.5 \mathrm{~mm}$.

Femora black to dark brown basally, ferruginous distally (hindfemur nearly all black in some individuals). Tibiae ferruginous, pale yellow dorsally or (foretibia) on outer side. Tarsi brown or lerruginous.
8.-Mandible: inner margin with no subbasal tooth. Clypeus
(Fig. 23g, h): lobe sharply pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hondocellar scar and orbit about $1.5 \times$ scar length. Flagellomere I: dorsal length 1.1-1.2 $\times$ apical width. Foretrochanteral notch slightly shorter than distance that separates it from trochanteral apex (Fig. 24a); notch bottom with row of erect setae (Fig. 24b). Forebasitarsus with 3 rake spines; longest spine equal to apical width of basitarsus or slightly shorter. Dorsum of midbasitarsus and of hindbasitarsus without preapical spines. Inner claws of mid- and hindtarsus slightly


Figure 21. Gastrosertcus baobabicus: a. male foretrochanter ( $=316$ ); b, bottom ol foretrochanteral notch (. 567).
smaller than outer claws. Pygidial plate densely setose. Sterna without mesal depressions, uniformly and closely punctate throughout; setae of sterna III-VI slightly longer than basal setae of sternum 11. Sternum VIII rounded to inconspicuously emarginate apically. Volsella: Fig. 23i. Length $5.1-6.9 \mathrm{~mm}$.

Femora black, with yellow apical spot that is longer ventrally than dorsally. Tibiae dark brown to brown red except pale yellow on outer side (foretibia) or on dorsum (mid- and hindtibiae). Foretarsus yellow, midtarsus yellow basally and red apically, hindtarsus red except basitarsus yellow.

Geographic Distribution (Fig. 9).-Southern Africa.
Records. - BOTSWANA. Serowe (I q. ZMK)
MOZAMBIQUE: Delagoa Bay ( 1 ס, ZMHU).
NAMIBIA: Gobabis District 8 ms W Gobabis ( 1 ?, BMNH), 40 km W Wjivleı (1 8, CAS). Grootfontein District: 30 km NE Grootfontenn (18. CAS). 90 km NE


 Okahandja District: Okahandja ( 1 f, BMNH). Outjo: Etosha Natıonal Park at $18^{\circ} 46^{\prime} \mathrm{S}, 14^{\circ} 44^{\prime} \mathrm{E}(1 \mathrm{~F}, \mathrm{SMNW})$. Rehoboth District 23 km N Rehoboth ( $28, \mathrm{CAS}$ ).
SOUTH AFRICA Natal: Cape Vidal $20 \mathrm{mı}$ N St. Lucıa (1 סै, UCD); Zululand. $20 \mathrm{mı}$ S Ndumu Game Reserve Camp (1 \&, UCD). Transvaal: D'Nyala Narure Reserve, $23^{\circ} 45^{\prime} \mathrm{S}, 27^{\circ} 27^{\prime} \mathrm{E}(18$. NCIP), Ellisras ( 38,1 名, AMG; $18, \mathrm{CAS}$ ), Mooketsı (I \&, CAS; 3 \&, USNM)
ZIMBABWE: Igusi (1 ㅇ. AMG), Lupane ( 1 ㅇ, USNM), Matetsı in Hwange District (2 9 , UCD, USNM), 11 km NE Nyamandhlovu al $19^{\circ} 48^{\prime} \mathrm{S}, 28^{\circ} 16^{\prime} \mathrm{E}(39$, CAS), Sawmılls ( 1 \&, AMG: 1 \&, BMNH; 1 f. SAM, 1 §, ZMA, 1 \&, ZMHU), Vicioria Falls ( 15 q, 3 \%, CAS, 1 q, CU; 1 q, FSAG. 1 q, IEE: 4 q, 1 o, NHMZ. 2 9.28. SAM, including holotypes of braunsi and laticeps; 28. (ISNM.18. ZMA).

## Gastrosericus capensis Brauns

(Figures 22, 25, 26)
Gasterosericus [sic] capensis Brauns, 1906:49, 8. ․ Lectolype: §, South Africa: Cape Province: Willowmore (TMP), present designation, examined. - Brauns, 1911:239 (nesting in sand); Arnold, 1922:117 (redescription), 1930:2 (listed): Bohart and Menke, 1976:256 (listed): Dollfuss, 1989:9 (paratype in NHMW).

Diagnosis.-Gastrosericus capensis has a shiny, triangular elevation on the propleuron (as in Fig. 143b) and long setae adjacent to the oral fossa (setal length $0.6-0.7 \times$ basal width of mandible). Also, scapal and hindfemoral setae are appressed but
many frontal setae are semierect. Many guigliae are similar, but the female clypeus of capensis is distinctive: the arcuate (median) portion of the free margin is unusually narrow (Fig. 25a). Unlike guigliae, the male of capensis has a simple hypostomal carina (carina expanded in guigliae). Additional recognition features are: clypeus yellow, inner margin of female mandible with large preapical tooth (Fig. 25b), free margin of clypeal lobe acutely angulate in male (Fig. 25c).

Description.-Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin roundly emarginate. Orbit closer to hindocellar scar than to antennal socket. Propleuron near hindmargin with shiny, friangular elevation that is slightly rising posterad. Scuium and mesopleuron with well-defined punctures, mesopleural punctures up to one diameter apart (interspaces shiny). Scutal flange evenly curved throughout. Marginal cell: length of costal margin $2.4-2.8 \times$ apical truncation. Recurrent veins interstitial above.

Setal length $0.6-0.7 \times$ basal width of mandible on frons and adjacent to oral fossa, on thorax (including propodeum), and fore- and midfemoral venter. Setae straight or sinuous adjacent to oral fossa, almost straight on mesopleuron and mesothoracic venter, and setae intermediate or of both types on remaining thorax; partly obscuring mesopleural integument; appressed on scape and hindfemur; many setae semierect on upper frons.

Head black, but the following are yellow: mandible (except apex), scape (except dorsally or dorsobasally) and clypeus; flagellum black to brown. Thorax black, but pronotal lobe, tegula, and humeral plate yellow. Gasier red. Femora all black (except yellow apically) or hind femur red; tibiae reddish, yellow dorsally or (foretibia) on outer side. Tarsi reddish. Wings almost hyaline.

ㅇ.- Mandible (Fig. 25b): inner margin without subbasal tooth. with round, shallow cleft, and preapical tooth. Clypeus (Fig. 25a): disk without teeth or carinae; free margin of lobe arcuate except concave laterally near corner (which is evanescent, illdefined): distance between comers $1.25 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $0.8 \times$ scar length. Gena simple. Flagellomere 1: dorsal length $1.9 \times$ apical width. Pronotum: precollar not carinate


Figure 22. Collecting localaties of ciustrmericu thetubturus and capenses
laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 6 or 7 rake spines; length of apical spine $2.0 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine about $1.0 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum 11 apicomesally with glabrous, triangular area. Pygidial plate covered with stout setae. Length $7.5-8.0 \mathrm{~mm}$.
8. - Mandible: inner margin with no subbasal tooth. Clypeus (Fig. 25c): lobe acutely pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about $0.8 \times$ scar length. Flagellomere I: dorsal length $1.75 \times$ apical width. For-
etrochanteral notch shorter than distance that separates it from trochanteral apex (Fig. 26a), its bottom with irregular row of setae, with irregular, scale-like integument adjacent to setae (Fig. 26b). Forebasitarsus with 3 or 4 rake spines: longest spine 2.0 $\times$ apical width of basitarsus. Dorsum of mid- and hindbasitarsus each with two preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna III and IV depressed (except laterally), depressions fimbriate, fimbriae depressed basally and fully concealing integument, curving ventrad apically; sterna V and VI with usual, long setae delimiting apical depression, and also with markedly shorter, erect setae. Sternum VIll rounded apically. Volsella: Fig. 25d. Length 6.5-7.4 mm.

 mandible $(x 47)$, e, head laterally $(\times 34) ;$ f, female forecosa $(\times 6.3), \mathrm{g}$, male head frontally $(\times 39)$; h, male clypeus $(x 84)$, 1 , volsella $(\times 270)$.

Geographic Distribution (Fig. 22).-South Africa (Cape Province) and Namibia.

Records.-NAMIBIA: Damaraland: Uis (18, NCIP) Karibib District: 15 km W Karıbib ( 1 \%, MS), 65 km SW Usakos (29. CAS, MS). Lüderitz District: Aus
(28, BMNH, 28, 6 8, CAS, 38,10 3, MS). Maltahohe District: Sesriem Farm (4 ó, BMNH). Okahandja District Okahandja (? $\delta$, BMNH). Rehoboth District: 7 km N Rehoboth (1 ㅇ, I of, CAS; 1 of, MS), 23 km N Rehoboth (1 b, CAS). Swakopmund District: Goanikontes 21 m E Swakopmund ( $18, \mathrm{BMNH}$ ), Gobabeb ( 18,2 8, UCD). Gobabeb at Kuiseb River bed ( 3 \&. 6 of, CAS, 13 \&. 24 \%, NCIP.


Figure 24. Giasirosericus hratmu, male: a, foretrochanter ( 83 ); b, bottom of foretrochanteral notch ( $\times 226$ ).
19. PMA. 28, UCD, 3 玉, 8 \&, ZMK). 6 km SW Gobabeb ( 1 f, ZMK) ), Sossusvle1 ( 3 z, BMNH), Swakopmund ( $18,2 \&$, CAS, 1 ㅎ, $9 \delta, \mathrm{JG}, 18,2 \delta, \mathrm{MS}$ ), mouth of Swakop River ( 3 3. UCD); Swakop River 10 km E Swakopmund (28, 168, CAS. 88.30 z, MS) 15 km E Swakopmund ( $1 \mathrm{\delta}, \mathrm{JG}, 1 \% .48, \mathrm{MS}$ ), mouth of Ugab Riser (18, 18, CAS; 48, UCD; 19,28, ZMK), Upper Ostrich Gorge, 2229'S, $14^{\circ} 59^{\prime} \mathrm{E}$ (2 8 , SMNW), Vogelfederberg, circa 55 km N Gobabeb (1 8, CAS, 1 ó, FSCA, 1 \& , 1 8, SDNH), 30 km E Walvis Bay ( $18, \mathrm{FS}(A)$ ) Walvis Bay Territory Roorbank (3 \%. AMG; 1 8, ZMK), Walvis Bay (3 8, CAS, 1 3. MS).

SOUTH AFRICA Cape Province: 20 km N Pofadder ( 1928.2 FSCA), Rettbron ( $18,1 \delta, A M G$ ), Vioolsdnft (1 \%, AMG), Willowmore (2q, 1 §, AAIG; 1 \&, ANSP.

1 \&, 1 \&, BMNH, paralectotypes; 18, CAS, paralectotype; 18, 1\&, CU; 3q, 1 \&, NHMW, paralectotypes; 1 \& TMP, lectotype; 1 ?, 1 \&, UCD).

## Gastrosericus chalcithorax Arnold

(Figures 27-29)
Gastrosericus chatcthorax Arnold, 1922:116,8.8 (as Brauns' MS name). Lectotype: $\delta$, South Africa Willowmore (TMP), present desigoation, examined. Brauns, 1911:239 (nestung in sand, nomen nudum); Arnold. 1930:2 (listed), Bohart and Menke, 1970:256 (1sted), 260 (illustration of female mandible).


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Figure 26. Gastrosericus capensis, male: a, foretrochanter ( * 158 ); b, botiom of foretrochanteral notch ( $\times 395$ ).

Lectotype Selection. - Arnold (1922) described both female and male of this species and designated a type, but did not indicate the type's sex. The specimen I have received for study is a male labeled as a type by him. I have designated it as the lectotype of Gastrosericus chalcithorax.

Diagnosis. - Gastrosericus chalcithorax has appressed genal
and propodeal setae and a simple pronotum (precollar not carinate, side not sulcate). The female has a distinctive clypeus (Fig. 27a): the free margin of the lobe is arcuate or shallowly sinuate, and the disk is glabrous and swollen along the midline (swelling obtusely angulate in profile, Fig. 27b). Subsidiary recognition features are: gena simple (not dentate), pygidial plate


[^1] mandible $(\times 69)$, d, male clypeus $(\times 82)$, e. volsella ( 314 ).


Figure 28 (iastrosericus chalcitheras, mate: a, foretrochanter $(\times 284)$, b, bottom of foretrochanteral notch $(\times 546)$.
inconspicuously setose (only a few apical setae are stout), gaster red (at least basally), femora yellow apically, and the apical rake spine of foretarsomere 1 equal to $1.9-2.0$ tarsomere width.

In the male, the vestiture is appressed; the free margin of the clypeal lobe is markedly, roundly arcuate and not angulate laterally (Fig. 27d); the foretrochanteral notch is deep; sternal setae are short, uniform; the scape is black (translucent apically); the gaster is red basally; and the hindlemur is black (yellow apically). The males of funereus and karooensis are similar, but chalozthorax has a distinctive foretrochanteral notch: the bottom has a row of erect microsetae (Fig. 28a, b). Exceptional karoocnsis also have a row of setae in the trochanteral notch, but the clypeal lobe of chalcithorax is more pointed (compare Figs. 27 d and $57 \mathrm{c})$. Other features of chalcthorax are: scutal flange evenly curved, clypeal disk of many specimens raised and glabrous along midline.

DESCRIPTION. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin biarcuate or shallowly, broadly emarginate. Orbit slightly closer to hindocellar scar than to antennal socket in the female, equidistant in male. Propleuron simple. Thorax finely microsculptured. but individual punctures discernible on scutum. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.0-4.0 $\times$ apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed, including setae between propodeal side and hindface; mesopleural setae largely concealing integument.

Head black, mandible yellowish reddish (except apically), flagellum brownish or yellowish ventrally in males and many females. Thorax black, but pronotal lobe, tegula, and humeral plate pale yellow. Gaster all red or segment III and following black. Femora black, with pale yellow apical spot (black replaced by reddish brown on hindfemur in some females); yellow spots equal in size, or largest on forefemur and smallest on hindfemur. Tibiae ferruginous, pale yellow dorsally or (foretibia) on outer side. Tarsi ferruginous in female, yellowish in male. Wings hyalinte.
Q.- Mandible (Fig. 27c): inner margin with one subbasal tooth and cleft but without preapical tooth. Clypeus (Fig. 27a): disk
without teeth or carinae, narrowly raised and glabrous along midline (except basally), markedly convex (almost angulate) in profile (Fig. 27b); free margin of lobe arcuate or sinuate, corner well-defined; distance between corners 2.3-2.5 $\times$ distance between corner and orbit. Distance between hindocellar scar and orbit about equal to scar length. Gena simple. Flagellomere I: dorsal length $1.4 \times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 4 or 5 rake spines; length of apical spine $1.9-2.0 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine $1.0-1.5 \times$ apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II asetose apicomesally. Pygidial plate with thin, inconspicuous setae except one to four apical setae stout (mostly two). Length $6.0-6.5 \mathrm{~mm}$.
§. - Mandible: inner margin with no subbasal tooth. Clypeus (Fig. 27d): free margin of lobe arcuate to obiusely pointed, not angulate laterally, its free margin forming single curved line with resi of clypeal margin; clypeal surface of many specimens raised and glabrous along midline (except basally). Distance between hindocellar scar and orbit about $1.3 \times$ scar length. Flagellomere 1: dorsal length $0.8-1.0 \times$ apical width. Foretrochanteral notch longer than distance that separates it from trochanteral apex (Fig. 28a), compressed to a setose crest (Fig. 28b). Forebasitarsus with 3 rake spines; longest spine $1.3-1.6 \times$ apical width of basitarsus. Dorsum of midbasitarsus with no to two preapical spines, hindbasitarsus with one or two such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna without mesal depressions, uniformly, closely punctate throughout: sternal setae short, uniform. Sternum VIII rounded apically (most specimens) or emarginate (lectotype). Volsella: Fig. 27e. Lengih 4.3-5.0 mm.

Life History. - In Namibia, chalcithorax occurs almost exclusively on alluvial sands, such as dry river beds. 1 observed a colony in a dry river 49 km S Rehoboth. Namibia, on 9 February 1990. The site was a barren area of sand mixed with fine gravel. A female began to dig her nest at 10:18. She used her mandibles to carry pebbles (some as large as her head). She walked backwards away from the nest, dropped the pebbles, and started walking toward the nest while raking the area. As a


Figure 29. Collecting localities of Gastrosericus chalcthorax. dentatus, and drewsem
result, no tumulus accumulated. Initially she reappeared from the gallery every $10-20$ seconds, but later the intervals were as long as $50-130$ seconds. She started the orientation flight at 11:47 and went hunting at 11:48. The orientation flight was a series of irregular loops, first near the nest entrance, then further and further away. She brought in the first prey at 11:51 and left the nest at 11:54. The wasp was collected at 11:56, as she was bringing her second prey. Prey consisted of small Homopterans (Cicadellidae, Paralimnini; determination by Michael D. Webb). They were dropped at the nest entrance (permanently open during the provisioning period) and then dragged in. The nest structure was not examined.

Geographic Distribution (Fig. 29). - South Africa and Namibia.

Records.-NAMIBtA: Damaraland Khonxas (1 q, MS), Ugab River (3 fo, UCD). Gobabis District Gobabıs (1 \&. AMG). Karibib District: Ameıb Farm 19 m NW Kanbıb (18, BMNH), 43 km E Kanbıb (29. CAS, $18,28, \mathrm{MS}), 23 \mathrm{~km}$ N Kanbıb ( 5 \& , 8 8, CAS, 15 8, MS), 15 km W Kanbıb (2 8, CAS), 17 km W Usakos (1 \%, CAS). Keetmanshoop District: Aroab (3 \&, AMG), Seeheim (1\& BMNH, 1 oै, ZMK), no specific localily ( 1 \&, 2 of, UCD), Mariental District 65 km S Manental (18. CAS). Okahandja District Okahandja (158.33 of, BMNH: 4 \&
 ( 1 f., CAS), 17 km W Okahandja ( 68, CAS, 68,1 8, MS). Omaruru District: 25 km NE Omaruru ( $18, \mathrm{ZMK}$ ) Otjiwarongo District: 80 km S Otımarongo ( 18,1 8 CAS, 38 , MS). Outjo District. 31 km SE Kamanjab ( 1 b, CAS). Rehoboth District


[^2]15 km N Kalkrand ( $28, \mathrm{CAS} ; 3$ 8, MS), 27 km N Kalkrand (18, 18, CAS) 7 km
 MS), 49 km S Rehoboth ( 16 \&. CAS, 13 2. M1S). Swahopmund District. Kurseb Canson $23^{\circ} 18^{\prime} \mathrm{S}, 15^{\circ} 45^{\prime} \mathrm{E}\left(1\right.$ b, BM1NH). Windhoek District Kos. $23^{\circ} 16^{\circ} \mathrm{S}, 10^{\circ} 08^{\prime} \mathrm{E}$ (18, SMNW), Sees ( 1 \&, CAS), Wasservalle1, 2205 'S. $16^{\circ} 22^{\prime} \mathrm{E}$ ( 1 \&. SMNW), 37 km N Windhock ( 28. CAS, $18,3 \mathrm{\delta}^{\circ} . \mathrm{MS}$ ), 3. Also Namal [probably Namaland] (1 \&, UCD).

SOUTH AFRICA Cape Prosince: Ohfantshoek (1 \& CAS), Willowmore (1 t TMP, lectotype of chalcthorat, 1 \&, UCD)

Gastrosericus dentatus sp. n.
(Figures 29. 30)
Derivation of Name. - Demtatus is a Latin masculine adjective meaning toothed: with reference to the shape of the female clypeus.

Diagnosis. - The female of dentatus is unique in having the clypeal free margin with five teeth (Fig. 30a). Also unique is the combination of appressed scapal setae and semierect hindfemoral sctae. The unknown male presumably has the same setal characteristics.

Description (based on female only) - Mandible: posterior margin notched, abductor ridge absent. Orbit closer to hindocellar scar than to antennal socket. Propleuron near hindmargin with shiny, triangular elevation that is slightly rising posterad. Vertex punctures microscopic but well-defined, less than one diameter apart. Scutal and mesopleural punctures well-defined, almost contiguous on mesopleuron, averaging less than one diameter apart on scutum; scutal interspaces shiny. Scutal flange evenly curved throughout. Marginal cell: length of costal margin $1.9 \times$ apical iruncation. Recurrent veins separate.

Setae sinuous on head and thorax, partly obscuring mesopleural integument; $0.7 \times$ basal width of mandible or slightly longer on propodeum and adjacent to oral كossa; appressed on scape and hindfemoral venter, but semierect on outer side of hindlemur.
8. - Mandible (Fig. 30b): inner margin with subbasal cleft that separates two rounded expansions, with preapical tooth. La-
brum: free margin roundly emarginate. Clypeus (Fig. 30a): disk without teeth or carinae; free margin of lobe with five teeth. corner well-defined; distance between corners about 1.5-1.6 $\times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $0.7 \times$ scar length. Gena simple. Flagellomere I: dorsal length $1.6-1.75 \times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 7 rake spines; length of apical spine 2.0$2.2 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine about $1.25 \times$ apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally with glabrous, triangular area. Pygidial plate covered with stout setae. Length $6.7-7.2 \mathrm{~mm}$.

Head, thorax (including pronotal lobe), gaster, and femora black, except the following: mandible pale yellow (except black apically), middle clypeal section yellowish anteriorly (free margin reddish), femoral apex yellowish or reddish. Tibiae varying: all red except yellow dorsally in holotype; in paratype, foretibia yellowish brown, brown laterally and ventrally except at base and apex, mid- and hindtibiae black, pale yellow basally and brown apically. Tarsi red (holotype) or brown (paratype). Wings hyaline.

## ©. - Unknown.

Geographic Distribution (Fig. 29). - Senegal to Ghana.
Records.-Holotype: \&, GHANA. Kawampe, $8^{\circ} 30^{\prime} \mathrm{N}, 1^{\circ} 35 \mathrm{~W}, 45 \mathrm{~km}$ N Kintampo, 21 Feb 1991, WJP (CAS) Paratype: SENEGAL Koumpentoum. Mar 1976. G Couluner (1 \&. UCD).

## Gastrosericus drewseni Dahlbom

(Figures 29. 31)
Gasterosencus [sic] Drewsem Dahlbom. 1845:467. 8, incorrect onginal capitalızathon Lectotype: \&. Egypt no specific locality. (Stockholm, coll. Hedenborg), designated by de Beaumont, 1960b 245, not examined. - Kohl, 1885:409 (as synonym of walthr): Dalla Torre, $1897: 695$ (as synonym of walth); de Beaumont, 1956:204 (companson with gughae), 1960b.245 (study of holotype), 1966:212 (Egy pt), de Beaumont, Bytınskı-Salz, and Pulawskı, 1973:16 (Israel); Bohart and Menke, 1976:256 (listed).
As Gastrosericus morket: Giner Mari, 1945:376, Fig. 7b, present correchon.
Diagnosis. - Gastrosericus drewseni has a shiny, triangular elevation on the propleuron (as in Fig. 143b), and long, sinuous setae on the head and thorax, including the scapal and hindfemoral venters (setal length, adjacent to oral fossa, about equal 10 basal width of mandible). In the female, the clypeal lobe is obtusely pointed (Fig. 3la-d) and the gaster is all red in most specimens (but all black in some). The female of walthi is similar, but the clypeus is obtusely truncate (Fig. 142a, b) and the gaster is all black or red basally and black apically. The female of shestakov is unknown, but the marginal cell is unusually short in that species (costal margin $1.1-1,2 \times$ apical truncation, while 2.0-2.2 in drewseni).

The males that I assign to drowsen were collected together with females of this species, e.g., in Agami and Wadi Digla, Egypt, and in Beersheba, Israe! (the specimens from Beersheba were determined as drewsen by de Beaumont). They are morphologically identical to waltlit and can be distinguished from that species only tentatively by the following color details: tibiae all red or brown ventrally (yellowish basally), and gaster all red or black preapically (segments III-V1, or IV and V, or V and V1 black, but segment VII red). Males of walliti vary in color: the darkest ones have black tibiae and gaster; in the lightest


Figure 31. Gastrosericus drwsem: a, female clypeus ( 62 ); b-d, outines of female clypeus showing individual variation ( $\times 02$ ); e, female mandible ( $\times 74$ ), f, male clypeus $(\times 70$ ).
ones (some Egyptian and Israeli specimens), the tibiae are red and the gaster is red basally but black apically. Perhaps such lightly colored males occur in both species (see also the following paragraph).

Relationship to Gastrosericus haltlil.-Gastrosericus drewseni and waltlii are very similar, including identical volsellae. They differ primarily in the shape of the female clypeus, although the gastral color helps in recognition. Most females can be easily assigned to one or the other species, but the clypeus is somewhat intermediate in three specimens that 1 regard as drewseni (Fig. 31b-d); two of them also have a black gastral apex (gaster all red in other females of drewseni). These specimens suggest a full intergradation in both characters. Possibly drew'seni is but an extreme form of waltlii. So far, however, I have not observed full intergradation in localities where the two occur together (waltlii is widely distributed in Africa and Asia, but drewseni is found between Jordan and Libya).

Description. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin acutely emarginate. Orbit closer to hindocellar scar than to antennal socket. Propleuron near hindmargin with shiny, triangular elevation that is slightly raised posterad. Scutum and mesopleuron with well-defined, almost contiguous punctures. Scutal flange slightly expanded adjacent to tegula, contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin 2.0-2.2 $\times$ apical truncation. Recurrent veins separate or interstitial above.

Setae sinuous on thorax and also adjacent to oral fossa, where they are equal to basal width of mandible or slightly longer, totally obscuring mesopleural integument; sinuous, semierect on scape and hindfemoral venter (semierect setae inconspicuous in a female from Beersheba, CAS).

Head black, mandible pale yellow (dark apically), clypeus partly red apicomesally. Thorax black except pronotal lobe narrowly pale yellow posteriorly. Gaster all red in most females
and many males, but darkened in some specimens from Agami, Egypt, and segments 111-V1 largely black in a female from Wadi el Tih and all black in a female from Ghiza Pyramids; gaster black preapically in many males (e.g., segments III-V1, or IV and $V$, or $V$ and VI, but segment VIl red or reddish). Femora black, except reddish or yellowish apically. Tibia and tarsi red. Wings hyaline.
9.-Mandible (Fig. 31e): inner margin without subbasal teeth or cleft but with preapical tooth. Clypeus (Fig. 3la-d): disk without teeth or carinae; lobe roundly prominent, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about $0.8 \times$ scar length. Gena simple. Flagellomere I: dorsal length $2.0 \times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with $7-9$ rake spines: length of apical spine 2.2-2.4 $\times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine $0.9-1.0 \times$ apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally with glabrous, triangular area. Pygidial plate covered with stout setae. Length $7.5-9.0 \mathrm{~mm}$.

Tibiae red, pale yellow dorsobasally.
ס. - Mandible: inner margin with no subbasal tooth. Clypeus (Fig. 31 f ): lobe acutely pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about equal to scar length. Flagellomere I: dorsal length $1.75-2.0 \times$ apical width. Foretrochanter not notched but slightly constricted near base. Forebasitarsus with 4-6 rake spines; longest spine 2.0-2.5 $\times$ apical width of basitarsus. Dorsum of mid- and hindbasitarsus each with two or three preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna III and IV (except laterally) with fimbriate depressions, fimbriae appressed basally and fully concealing integument, curving downward api-

 321)
cally; sterna V and V1 with straight setae that delimit apical depression, and also with shorter, dense, erect setae. Sternum VIII rounded apically, Length $6-7 \mathrm{~mm}$. Volsella as in Egypian specimens of walthi (see Fig. 142g).

Tibiae all red or brown ventrally
Misidentified Specinens. - Giner Mari ( 1945 ) compared his new species aimensis with moricel and illustrated the female clypeus of the latter. The figure indicates an insect that is very different from the real moricei. I studied three specimens upon which Giner Marí most probably based his interpretation: one female and two males from Cairo area, Egypt (IEE). The female and one male are labeled "Gastrosericus". and the other male "Gastrosericus moricel". The female's clypeus agrees well with Giner Mari's illustration and was probably the original model. All three specimens are drewsoni.

Geographic Distribution (Fig. 29). - Libya, Egypt, Israel, Jordan.

[^3]Jizah (= Ghiza): Ghıza Pyramuds (18.18, CAS, 18, \& 8, NHMW). Al Qahirah
 NHMW), Wadı el Tih (I \&, CAS, 3 \&. NHMW), "W Garaui, Caro" (I \&, 2 ó, 1EE), "Wadı Garau", A Altien collector (1 8, MZL), Wadı Hof (2 ㅇ, CAS, 5 \&, NHMW). As Sahra al Gharbiyah Marsa Matruh (3 ó, CAS). Bani Suwayf (= Bens Suef) $30-40 \mathrm{~km}$ SE EI Wasta on road 10 Ras Zafarana (28, 18, AAM; 18. (AS).
 2 \&, 3 8, RMNH), also Beerı, Revivim, and Yeroham (de Beaumont. ByinshiSalz, and Pulawski, 1973).

JORDAN Kasr Amra, $31^{\circ} 47^{\prime} \mathrm{N}, 36^{\circ} 35^{\prime} \mathrm{E}$ ( 1 है, AAM).
LIBYA Cyrenaica Baltet er Ramla S Mechilı (2 \& BMNH, MZL), Tmımı (2 8. 28, BMNH; 18, MZL).

## Gastrosericus electus Nurse

(Figures 32-34)
Gastroserictas electus Nurse, 1903:7. 8. Lectolype: 9. Inda Gujarat: Deesa (BMNH). present designation, exammed. - Bohart and Menke, 1976:256 (Isted).
Gastroserticus flaviorms Gussakovskij, 1931:454, \&, 8. Lectotype: ס, Uzbekistan: Khiva (ZIN), present designation, examined New synonym. - Bohart and Menke, 1976:256 (listed), Kazenas, 1978:137.

Diagnosis. - The female of electus has an evenly arcuate clypeal lobe and the clypeal disk with no teeth or carinae (Fig. 32a),


Figure 33. Gastrosericus clectus, male: a, foretrochanter $(\times 254)$, b. midbasitarsus $(\times 224$ ).
the gaster is all red, the pygidial plate is either asetose or has a few, stout setae apically, and the femora are red or brown red with large pale yellow spots apically. Gastrosericus chalcithorax, senegalensis and some karooensis are similar. In electus, however, the clypeal disk is uniformly sculptured (with a glabrous, longitudinal swelling in chalcthorax), and the scapal venter is yellow (scapal venter black in chalculhorax, karooensis, and senegalensis).

In the male, the vestiture is appressed; the free margin of the clypeal lobe is prominent, obtusely arcuate and not angulate laterally (Fig. 32c); the foretrochanteral notch is deep, and sternal setae are short, uniform; the scape is yellow; and the gaster all or largely red, without yellow markings. Unlike other species with these characteristics, the flagellum of electus is yellow ventrally rather than black or dark brown (flagellum all yellow in most specimens); unlike senegalensis, the longest spine of the forebasitarsus is no longer than the basitarsus width (rather than $1.2-1.7 \times$ width). The glabrous, shiny bottom of the trochanteral notch is a subsidiary recognition feature (Fig. 33a). The notch is setose or glabrous in senegalensis and setose in most other species.

Description. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin shallowly, broadly emarginate. Orbit slightly closer to postocellar scars than to antennal socket in female, equidistant in male. Propleuron simple. Thorax microsculptured, without well-defined punctures. Scutal flange evenly straight or minimally expanded adjacent to tegula, concave between expansion and hindcorner. Marginal cell: length of costal margin 2.5-5.0 $\times$ apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture short, appressed, including setae adjacent to oral fossa (a few setae erect between propodeal side and hindface); almost totally obscuring mesopleural integument.

Head black, but mandible pale yellow (dark apically); scape pale yellow (only ventrally in many females); color of clypeus and flagellum varying sexually (see below). Thorax black, but pronotal lobe, tegula and humeral plate pale yellow. Gaster ferruginous in females and most males, some males with all
sterna or segments IV-VII black. Femora and tibiae mostly red, femora with pale yellow apical spots (which are longer ventrally), but in some specimens red replaced by brown (on midfemur in single femate from Pusa, India, on fore- and midfemora in some African males); tarsi yellow or yellowish reddish. Wings hyaline.
8. - Mandible (Fig. 32b): inner margin with obiuse subbasal 10oth and cleft, but without preapical tooth. Clypeus (Fig. 32a): disk without teeth or carinae; free margin arcuate, corner welldefined; distance between corners 2.2-2.5 $\times$ distance between corner and orbit. Distance between hindocellar scar and orbit about one scar length. Gena simple. Flagellomere I: dorsal length $2.0 \times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 or 6 rake spines; length of apical spine $1.7-2.0 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine 1.3$1.5 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum II apicomesally with glabrous, triangular area. Pygidial plate asetose or with thin, inconspicuous setac and also with two stout, appressed, preapical setae (see Variation below for details). Length $4.8-7.0 \mathrm{~mm}$.

Clypeal lobe pale yellow or reddish anteriorly, all black in some African specimens. Flagellum black or dark brown dorsally, yellow brown ventrally.
8.-Mandible: inner margin without subbasal tooth. Clypeus (Fig. 32c): lobe obtusely rounded, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about $1.2 \times$ scar length. Flagellomere 1: dorsal length $1.1 \times$ apical width. Foretrochanteral notch slightly longer than distance that separates it from trochanteral apex (Fig. 33a), its bottom glabrous, smooth, shiny. Forebasitarsus with $2-4$ rake spines; longest spine equal to apical width of basitarsus. Dorsum of midbasitarsus with one or no preapical spine (Figs. 32d; 33b), dorsum of hindbasitarsus without such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna without mesal depressions, closely, microscopically punctate throughout; sternal setae short. uniform. Sternum VIII evenly rounded apically. Volsella: Fig, 32e. Length $5.0-5.5 \mathrm{~mm}$.


Clypeus pale yellow to largely black. Flagellum all yellow in many specimens, brown basodorsally in some, yellow ventrally and dark brown dorsally in one male from Deesa, India.

Variation. - The pygidial plate of the female is completely asetose in specimens from India, Transcaspia, and most specimens from Pakistan. However, the pygidial plate has several evanescent setae and also two stout, preapical setae in two females from Kirthar National Park, Pakistan (out of the total of 33 females collected there). This case indicates that presence or absence of setae is not a species specific character in electus. In the African populations, the plate also has thin, inconspicuous setae as well as two appressed, preapical setae.

Life History. - I observed nesting habits of electus at Kirthar National Park, Pakistan, on 9 July 1989. A female digging in a bare area of fine sand adjacent to a corn field was noticed at 11: 30. She was standing on her mid- and hindlegs and using the foretarsal rake in the typical larrine manner, projecting sand under her body. From time to time she dragged small pebbles or lumps of soil in her mandibles. Occasionally she leveled the accumulated material with her forelegs, always facing the nest entrance. As a result, there was no tumulus. At 11:59 she stopped digging, walked around the nest, and performed a few orientation flights. She began hunting at the nest's proximity at 12:01, leaving the nest open. The first prey was caught and paralyzed some 30 cm away from the nest at 12:07, the second prey about one meter from the nest at 12:13; the third prey was brought in at 13:03. The female was collected at this time. All prey were first instar nymphs of a geophilous grasshopper, Verohippus sp. (Acrididae, Acridinae, det. N. D. Jago), carried on the ground or in short flights, dorsum up and headfirst under the wasp's body. The wasp dropped them at the nest entrance and subsequently dragged them in using her mandibles.

Geographic Distribution (Fig. 34).-Gastrosericus electus has been found in Sahel (Mali, Niger, Senegal) and in southern and southwestern Asia (Arabian Peninsula, Transcaspia, Pakistan, and northern lndia). The gap between the African and Asian localities is almost certainly due to inadequate collecting.

Records. - COMMONWEALTH OF INDEPENDENT STATES: Turkmenistan: Askhabad ( 38, ZIN, including 28 paralectotypes of flavicornts), Chardzhow (Gussakovsk11, 1931), Krasnovodsk (18, ZIN). Tajikistan: Aral on Vakhsh Rıver ( 1 o, Z1N), Dushanbe ( 1 \&, 1 o, LISNM, 1 \&, ZIN), Garauly on Vakhsh River, Kolkhozabad Disinct ( 4 \&. 10 8, CAS. 5 \&. 12 8, VLK), Yangrabad on Vakhsh River ( 1 8, CAS; 1 \&, VLK). Uzbehistan: Kasan (18, CAS), Khiva (19, 13 8, including lectotype of and I\&. 7 \& paralectotypes of flawcomms, ZIN, 1 \&, USNM).

INDIA: Bihar: Pusa ( 1 ㅇ, BMNH). Gujarat: Deesa (28, including lectorype \& of electus. BMNH. 4 8. 3 8. CAS).

MALI: 30 km W Gao (29, CAS), Hombori (28, CAS; 18. 7 8, MS), 25 km E
 2 f, CAS, $69,48, \mathrm{MS}), 45 \mathrm{~km}$ W Moptı ( 3 \&, CAS, 1 of, MS) 60 km NE San (2 8, MS), 100 km NE San (I \&. CAS).

NIGER: Abalak, $15^{\circ} 28^{\prime} \mathrm{N}, 6^{\circ} 16^{\prime} \mathrm{E}\left(18\right.$ 8, FSAG), Al Mola, $15^{\circ} 47^{\prime} \mathrm{N}, 6^{\circ} 45^{\prime} \mathrm{E}(18$, CAS, 18. 1 ठ', FSAG)
OMAN: Rostaq (1 ठ, CAS; 2 क. 3 ठ, KMG).
PAKISTAN: Punjab: Bahawalpur ( 4 8, CAS), Lal Suhandra Natıonal Park 34 km SE Bahawalpur ( 6 8, CAS). Sind Karachı (28, AMNH, BMNH), Kurthar Natıonal Park 150 km NE Karachs, $25^{\circ} 10^{\prime}-26^{\circ} 05^{\prime} \mathrm{N}, 67^{\circ} 10^{\prime}-67^{\circ} 55^{\prime} \mathrm{E}$ ( 33 \&, 9 \&, CAS).

QATAR: Al Shahanteh (I fo, CAS; 1 \&, 2 8, KMG). Al Sinnah (28, CAS, KMG).
SAUDI ARABIA: Haddat Ash Shım, $21^{\circ} 47^{\prime}$ N, $39^{\circ} 39^{\prime} E\left(28,1 \delta^{\circ}\right.$, BMNH), Hofuf (18, KMG).

SENEGAL: 25-35 km S Rıchard Toll (29, CAS, LUW; 5 ㅇ, 1 8, ZMA).
UNITED ARAB EMIRATES: Khor Fakkan (I \&, KMG).

## Gastrosericus eremicus sp. n.

(Figures 35-37)
Derivation of Name. - Eremicus is a Latinized masculine form of the Greek adjective eremicos, which is derived from eremia, a desert, solitude.

Diagnosis.-Gastrosericus eremicus has a unique scutum (Fig. $36 \mathrm{~b}, \mathrm{c}$ ): swollen next to the tegula and longitudinally depressed adjacent to the swelling (minimally so in temporalis, but not in other species); the scutal margin is markedly expanded over the tegula and not upturned into a flange (Fig. 36d). The female has a distinctive clypeus: the free margin is expanded mesally into a narrow prominence whose sides are convergent anterad, and the apex is truncate (Fig. 35a, b).

Description. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin acutely emarginate. Orbit closer to antennal socket than to hindocellar scar. Propleuron raised posteromesally (raised area setose). Thorax finely sculptured, scutal punctures indiscernible. Scutum swollen adjacent to tegula and longitudinally depressed along swelling (Fig. 36bd): Iateral scutal margin not upturned into flange, markedly expanded over tegula and contrastingly concave between expansion and hindcorner. Marginal cell: length of foremargin 3.2$3.5 \times$ apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Setae appressed, including those adjacent to oral fossa and on propodeum; obscuring mesopleural integument.

Head black, but clypeus all or partly yellow or reddish yellowish (yellow area limited to apex of clypeal projection in darkest specimen): mandible yellow (except apically); scape mainly black to largely yellowish and reddish. Thorax black in most specimens, but partly red in Arabian females (only scutum and scutellum black in female from Hofuf, also postscutellum and mesopleuron in female from Al Ain ); and the following are yellow: pronotal lobe, tegula, humeral plate, and scutal swelling adjacent to tegula. Gaster red. Femora red basally and yellow apically in most specimens, but red replaced by dark brown on fore- and midfemur in some females and single male from Pa kistan; yellow area longer ventrally than dorsally. Tibiae reddish, yellow dorsally or (foretibia) on outer side. Tarsi yellow Wings hyaline.
9. - Mandible (Fig. 35c): inner margin with widely obtuse subbasal tooth (which is evanescent in smallest specimens), without cleft or preapical tooth. Clypeus (Fig. 35a, b): disk without teeth or carinae; free margin practically straight between corner and orbit, with prominent median projection, emarginate between projection and corner (which is ill-defined, roundly angulate to evanescent); median projection narrowing anterad, truncate or shallowly emarginate apically. Distance between hindocellar scar and orbit equal to about two scar lengths. Gena with prominent tooth at level of mandibular base (Fig. 35d), tooth extending dorsad into carina that is prominent apically. Flagellomere 1: dorsal length 1.1-1.3 $\times$ apical widıh. Pronotum (Fig. 36a): precollar laterally with inconspicuous, longitudinal carina; side deeply sulcate. Forecoxa deeply concave admesally (except near hindmargin); concavity setose, slightly widening anterad (equal to about $0.2 \times$ of coxal foremargin anteriorly), delimited laterally by longitudinal, triangular expansion (Fig. 35e) which is inconspicuous in smallest specimens. Forebasitarsus with 5 rake

 forecona ( - 125), f. male chpeus ( * 124), g, volsella ( $\times 350$ ).
spines; length of apical spine $1.5 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine about $0.5 \times$ apral width of tarsomere. Venter of tarsomere $V$ without preapical spines. Pygidial plate with inconspicuous setae except sev-
eral apical setae stout. Sternum II uniformly pubescent throughout. Length $4.0-5.9 \mathrm{~mm}$.
t. - Mandible: inner margin widely angulate near base but without subbasal tooth. Clypeus (Fig. 35f): free margin of lobe


Figure 36. Gastrosericus eremicus: a, female pronolum laterally ( $\times 101$ ); b, female scutum dorsally ( $\times 67$ ); c. female scutum obliquely ( $~$ a 45 ); d, female tegula and adjacent scutum obliquely ( $\times 91$ ): e, male foretrochanter ( a 372).



Figure 38. fastrosericus curypus: a. female clypeus ( $\times 66$ ), b, female mandible ( $\times 72$ ), c, male clypeus ( 76 ) d. volsella ( -228 ).
obtusely pointed, not angulate laterally, forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about $1.8 \times$ scar length. Flagellomere 1: dorsal length about equal to apical width. Foretrochanteral notch markedly longer than distance that separates it from trochanteral apex (Fig. 36e), its bottom covered with erect setae (which are not arranged in rows or any other noticeable pattern). Forebasitarsus with 3 or 4 rake spines; longest spine 1.1-1.5 $\times$ apical width of basitarsus. Dorsum of midbasitarsus with one or two preapical spines, dorsum of hindbasitarsus with one or no such spine. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna without mesal depressions, microscopically, closely punctate throughout; sternal setae short, even. Sternum VIII roundly truncate apically. Volsella: Fig. 35g. Length 3.34.0 mm .

Geographic Distribution (Fig. 37)--Senegal, Mali, Arabian Peninsula to northwestern India.

Records - (MAK: Muhammed Aleem Khan, WAK: Waseem Ahmad Khan): Holotype: $\ddagger$, PAKISTAN: Sind: Kirthar National Park (headquarters) 150 km NE Karachi, $25^{\circ} 10^{\circ}-26^{\circ} 05^{\prime} \mathrm{N}, 67^{\circ} 10^{\prime}-67^{\circ} 55^{\prime} \mathrm{E}, 26-27$ June 1989. MAK, WAK, and WJP (CAS). Paratypes: INDIA Gujarat: Deesa, Aug 1901, C. G Nurse (1 \&, BMNH).

MALI: Hombori, 11 Aug 1991, MS (I 9, MS), WJP ( 1 §, CAS); 10 km E Moptı, 10 Aug 1991. MS, WJP (28, CAS, MS).

PAKISTAN: Punjab: Bahawalpur, 14 Jul 1989, WAK and WJP (38, CAS); Chenab River bank 27 km SW Multan, 18 Jul 1989, WAK and WJP (1 \&, CAS), Faisalabad, 16 Jul 1989, WAK and WJP (18, CAS). Sind same data as holotype (49.18, CAS); same data except 9 Jul 1989 (1 \&. CAS).

SAUDI ARAB1A: Hofuf, 21-26 Jun 1980, K. M. Guichard (18. KMG). SENEGAL: $25-35 \mathrm{~km}$ Richard Toll. 26 Aug 1989, H van der Valk ( 1 8., ZMA) UNITED ARAB EMIRATES: Al Aın, 10 Jun 1988, L. Hamer ( 1 ơ, KMG).

## Gastrosericus eurypus sp. n.

(Figures 38-40)
Derivation of Name. - Eurlpus is derived from the Greek words eurys (broad, wide), and pous, podos (a foot), with reference to the broad tarsomeres of this species. A noun in apposition to the generic name.

Diagnosis. - In the female of eurypus, the clypeal lobe is well defined, with an arcuate free margin and no teeth or carinae (Fig. 38a), and the pygidial plate has inconspicuous, sparse setae. Females of other species are similar (chalcithorax; electus, karooensis, siamensis, sumplex, sobrimus, and tissa), but in eurypus the clypeal lobe is longer, narrower (Fig. 38a), and the hindtarsomere III is broader (Fig. 39a): distance between lobe corners about $1.5 \times$ length of clypeal midlength, or 1.9-2.0 $\times$ distance between corner and orbit; length of hindtarsomere 111 about $1.3-1.4 \times$ apical width. In the other species, these ratios are: clypeal midlength $=2.0-2.2($ electus $), 2.3-2.5$ (most species) or 2.6-2.7 (simplex, sobrinus); and hindtarsomere $111=1.5$ (karooensis), 1.6 (chalcithorax, tissa), or 1.7-1.8 (most species).

In the male, the clypeal lobe has well-defined comers and an arcuate free margin (Fig. 38c). The clypeus is similar in simplex, but in eurypus the foretrochanteral notch is deep, not extending

 foretrochanter $(=210)$. e, same, notch botum ( $=489$ ).
to the trochanteral apex (Fig. 39d), with a conspicuous row of semierect cilia (Fig. 39e), and the hindtarsomere III is broad: length about $1.3 \times$ apical width (Fig. 39b, c). In simplex, the trochanteral notch is shallow, not clearly delimited distally (Fig. 111a, b), without a row of cilia, and the hindtarsomere 111 is narrow (length about $1.8 \times$ apical width).

DESCRIPTION. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin arcuate or with a rudiment of median notch. Orbit closer to hindocellar scar than to antennal socket (insignificantly so in male). Propleuron simple. Thoracic punctures fine, but well-defined on scutum and mesopleuron. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.3-4.0 $\times$ apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed, including setae adjacent to oral fossa:
propodeal setae nearly appressed between side and hindface; mesopleural setae partly obscuring integument.

Head black, mandible yellowish red except black apically, clypeus reddish along free margin of lobe. Thorax all black or pronotal lobe yellow and tegula yellowish red. Gaster all black or two or three basal segments red. Femora black except yellow apically. Tibiae all reddish, or all brown, or foretibia reddish, with yellow outer side, and mid- and hindtibiae reddish, with yellow dorsum. Tarsi reddish or brown. Wings slightly infumate.
9.- Mandible (Fig. 38b): inner margin with two subbasal tceth and well-defined cleft but without preapical tooth. Clypeus (Fig. 38a): disk without teeth or carinae; middle section slightly, evenly convex, uniformly punctate except for impunctate lip; free margin of lobe evenly arcuate, corner well-defined; distance between lobe corners about $2.0 \times$ distance between corner and


Figure 40. Collecting localities of (iastrosericus curipus. fhwwhlis. and fulant. The combined symbols indmate that two species occur in one locality
orbit. Distance between hindocellar scar and orbit about $0.9 \times$ scar length. Gena simple. Flagellomere 1: dorsal length 1.2-1.3 $\times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 rake spines; length of apical spine $1.2 \times$ apical width of basitarsus. Length of hindtarsomere III $1.3 \times$ apical width. Foretarsomere IV: length of inner apical spine $0.5-0.6 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum II pubescent throughout or narrowly glabrous apicomesally. Pygidial plate with sparse, inconspicuous setae. Length 6.2-6.8 mm.
8.- Mandible: inner margin with well-defined subbasal tooth. Clypeus (Fig. 39c): lobe well-defined, its free margin arcuate,
distance between corners $1.3 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about 0.75 $\times$ scar length. Flagellomere I: dorsal length about $1.25 \times$ apical width. Foretrochanteral notch deep, about as long as distance that separates it from trochanteral apex, with surface compressed to sharp crest that is covered with conspicuous setae (Fig. 39d); setae oriented toward trochanteral base (Fig. 39e). Forebasitarsus with 3 or 4 rake spines; longest spine about equal to apical width of basitarsus. Dorsum of midbasitarsus with one or two preapical spines, dorsum of hindbasitarsus with one such spine or without spines. Length of hindtarsomere III $1.3 \times$ apical width. Inner claws of all tarsi as large as outer claws.

 plate ( $\quad 75$ ): r. male head ( - 29). g. male clypeus ( $~ 73$ ) ; h, volsella ( 216 )

Pygidial plate densely setose. Sterna without mesal depressions, finely, almost uniformly punctate (punctures somewhat sparser on apical depressions in some specimens); sternal setae short, uniform. Sternum VIII emarginate apically (scarcely so in some individuals). Volsella: Fig. 38d. Length 6.1-6.4 mm.

Geographic Distribution (Fig. 40) - Western Cape Province of South Africa.

Records.-Holotype: $\%$, SOUTH AFRICA Cape Province: Cedarberg $15-30 \mathrm{~km}$ SE Clanwilliam, 24 Oct 1982, T.L. and R.L. Gnswold (USU) Paratypes: SOUTH AFRICA. Cape Province: Cedarberg $15-30 \mathrm{~km}$ SE Clanwilliam, date and collec-
tors as in holotype ( 3 ¢, 2 $\%$, CAS; 2 \&, $2 \delta$, USU), 12 Dec 1973, P. M F. Verhoeff (2 8, CAS, RMNH): Pakhurs Pass. 24 Oct 1982, T. L. and R. L. Griswold (18, USU); 13.5 m SSW Springbok, 7 Sep 1972, M. E. and B. J. lrwin ( 18 UCD): Wellington, Rooshoek, 17-30 Nov 1973, P. M. F. Verhoeff (I \&, RMNH).

## Gastrosericus fluviatilis Arnold

(Figures 40-42)
Gastrosericus fluvathis Arnold, $195 \mathrm{I}: 157$, ,, , 8 . Lectotype: ㅇ, Malı: Tillembeya on Niger River (BMNH), present designation, examıned.-Bohart and Menke, 1976:256 (listed)

Diagnosis. - Gastrosericus fluviatilis ranges from western Africa to Sudan. The female has a distinctive clypeus (Fig. 41a, b): the lobe includes a median projection and two lateral points, and the free margin is almost straight between the projection and the points. In addition, the gena has a tooth or at least a sharp tubercle (Fig. 41d). The Oriental rothneyi is similar, but differs in having two genal teeth (Fig. 97d) and the free margin of the clypeal lobe markedly concave between the projection and the points (Fig. 97a, b). The shape of the pronotum is a subsidiary diagnostic feature shared with neavei, rothneyi and some vedda: the side is sulcate, but the precollar has no lateral, longitudinal carina.

The male has a sharply pointed clypeal lobe (Fig. 4lf, g), appressed vertex setae, a weakly developed abductor mandibular ridge, black clypeus and gaster, and the inner claws of the mid- and hindtarsi are at least slightly smaller than the outer claws. Males of pulchellus (southern African) and rothneyi (Oriental) are similar, but in fluviatilis the side of the propodeal dorsum and of the hindface are shiny, with well-defined punctures (which are markedly larger than genal punctures adjacent to the orbits); and the setae, adjacent to the oral fossa, are nearly appressed, shorter than the midocellar diameter. In pulchellus. the propodeum is finely, uniformly sculptured, and in rothneyi the setae, adjacent to the oral fossa, are erect and about one midocellar diameter long. Gastrosericus modestus is also similar. but it has rows of conspicuous sternal setae (Fig. 75f) which are lacking in fluvianlis.

DESCRIPTION. - Mandible: posterior margin notched, abductor ridge evanescent. Labrum: free margin conspicuously emarginate. Orbit equidistant from antennal socket and hindocellar scar. Propleuron simple. Thorax finely punctured, but individual punctures visible on scutum. Scutal flange evenly curved throughout. Marginal cell: length of costal margin $4.0-4.5 \times$ apical truncation. Recurrent veins separate (male from Tambacounda), interstitial above, or confluent in a short petiole.

Setae nearly appressed adjacent to oral fossa, about $0.2 \times$ basal mandibular width; appressed on vertex; semierect between propodeal side and hindface; not obscuring mesopleural integument.

Head and thorax black, but the following are pale yellow: mandible (brown apically), scapal apex, pronotal lobe posteriorly, tegula, and humeral plate. Gaster black. Femora black, with pale yellow apical spot (spot longer ventrally than dorsally). Foretibia pale yellow, brown or light ferruginous on inner side; mid- and hindtibiae pale yellow, dark brown ventrally (dark zone not reaching apex in specimens from Mali). Foretarsus all pale yellow or ferruginous apically; midtarsus pale yellow basally, brown or ferruginous apically; hindtarsus all dark brown or pale yellow basally; all tarsi brown in the male from Senegal. Wings slightly infumate.
9.- Mandible (Fig. 41c): inner margin with two subbasal teeth


Figure 42. Gustrosertas fluvathis: male foretrochanter(, 234).
separated by cleft. without preapical tooth. Clypeus (Fig. 4la, b): disk without teeth or carinae; free margin of lobe mesally with narrow, almost parallel-sided projection and with lateral incisions, corner well-defined; distance between corners $2.6 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $1.0 \times$ scar length. Gena, behind mandibular base, with tooth adjacent to occipital carina (Fig. 41d), but tooth reduced to sharp tubercle in smallest specimens. Flagellomere I: dorsal length $1.6 \times$ apical width. Pronotum: precollar not carinate laterally, side sulcate. Forecoxa concave anteromesally, foremargin raised, swollen. Forebasitarsus with 5 or 6 rake spines; length of apical spine equal to apical width of basitarsus. Foretarsomere IV: length of inner apical spine $0.2-0.4 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum Il setose throughout. Pygidial plate densely punctate and setose except impunctate and asetose basomedially (Fig. 4le). Length $5.5-8.5 \mathrm{~mm}$.

ס. - Mandible: inner margin obtusely angulate subbasally. Clypeus (Fig. $41 \mathrm{f}, \mathrm{g}$ ): free margin of lobe pointed, not angulate laterally, forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about $1.6 \times$ scar length. Flagellomere I: dorsal length $1.3 \times$ apical width. Foretrochanteral notch deep, slightly longer than distance that separates it from trochanteral apex (Fig. 42); notch bottom uniformly setose. Forebasitarsus with 2 or 3 rake spines; longest spine $0.5 \times$ apical width of basitarsus. Mid- and hindbasitarsus without dorsal preapical spines. Inner claws of mid- and hindtarsi minimally smaller to markedly smaller than outer claws. Pygidial plate densely punctate and setose. Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIlI rounded or shallowly emarginate apically. Volsella: Fig. 41 h . Length $5.5-6.5 \mathrm{~mm}$.

Geographic Distribution (Fig. 40).-Senegal, Mali, and Burkina Faso to Sudan.

[^4]


SENEGAL: 70 km E Ǩolda (29. AAM, 18 . (AS). Tambacounda (1 8, FSAG). SUDAN: Tonga ( 18, BMNH).

Gastrosericus fulani sp. n.
(Figures 40. 43, 44)
Derivation of NAme. - Fulani. a western African ethnic group also known as Peul or Fula, a noun in apposition to the generic name.

Diagnosis. - Gastrosericus fulani is characterized by the fol-


Figiti 44 Gastronertews fuham. male Joretrochanter ( $\times 147$ )
lowing: propleuron with shiny, triangular elevation near hindmargin (as in Fig. 1 43 b), setae conspicuous adjacent to the oral fossa (setal length $0.6-0.7 \times$ basal width of mandible), and appressed on frons, scape, and hindfemur. Gastrosericus nama and many gugliae are similar, but in fuluni the mesopleural setae are sinuous (straight in nama); in the female, the free margin of the clypeal lobe is arcuate, angulate laterally (Fig. 43a). whereas differently shaped in the other two (see Figs. 49a and 80a); and the inner mandibular margin has no preapical tooth (tooth present in nama); in the male, the free margin of the elypeal lobe is roundly pointed (Fig. 43e), but obtusely pointed in namu and acutely angulate in gugliae; and setae of sterna V and Vl are uniformly long (in the other species, setae are short except the long, stiff setae that delimit apical depressions).

Description. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin roundly emarginate. Orbit closer to hindocellus than to antennal socket. Propleuron near hindmargin with shiny, triangular elevation that is slightly rising posterad. Scutal punctures well-defined, conspicuous; mesopleuron punctatorugose. Scutal flange evenly curved throughout or minimally expanded adjacent to tegula and contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin 2.0-2.4 $\times$ apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Setal length $0.6-0.7 \times$ basal width of mandible adjacent to oral fossa and partly on thorax (including propodeum); setae appressed on frons, seape, and hindfemur; mesopleural setae sinuous, partly obscuring integument.


Figure 45. Gastrosertcus funereto. Female: a, head frontally ( $\times 36$ ); b, clypeus ( $\times 65$ ): ce central pormon of clypeus with a transverse carina ( $\times 65$ ), d, clypeus of an aberrant specsmen from Oman ( $\times 51$ ), e, clypeus of an aberrant specimen from Untled Arab Emırates ( - 49), f. clypeus of an aherrant specimen from Turke) ( $\times$ 46); g , female head laterally ( $\times 40$ ); h , mandible ( $\times 80$ )

Head and thorax black, but scapal apex and venter pale yellow; clypeus yellow (specimens from Senegal) or brown (Togo): mandible (except apically), tegula, and humeral plate pale yellow (Senegal) or brownish yellow (Togo). Gaster red. Femora black (except apically) to red. Tibiae red, yellow dorsally or (foretibia) on outer side. Tarsi red. Wings almost hyaline.
9.-Mandible (Fig. 43b): inner margin with two subbasal, convex expansions separated by shallow concavity, without preapical tooth. Clypeus (Fig. 43a): disk without teeth or carinae: free margin of lobe arcuate except concave laterally; corners well-defined, separated by distance that is about $1.7 \times$ distance between corner and orbit. Distance between hindocellar scar
and orbit about $0.75 \times$ scar length. Gena simple. Flagellomere 1: dorsal length $2.2 \times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 7 rake spines; length of apical spine $2.6 \times$ apical width of basitarsus. Foretarsomere 1V: length of inner apical spine about $1.5 \times$ apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally with glabrous, triangular area. Pygidial plate covered with dense, stout setae. Length $7.5-8.5 \mathrm{~mm}$.
8.-Mandible: inner margin without subbasal tooth. Clypeus (Fig. 43c): free margin of lobe obtusely pointed mesally, not angulate laterally, forming single curved line with rest of clypeal


Figure 46. Gastrosericus finereus, mate. a, head frontally ( $\cdot 43$ ), b, clypeus $(\times 81)$, c. volsella ( $\times 241$ ).
margin. Distance between hindocellar scar and orbit about 0.8 * scar length. Flagellomere I: dorsal length 1.7-1.8 $\times$ apical width. Foretrochanteral notch asetose, about as long as distance that separates it from trochanteral apex. Forebasitarsus with 25 rake spines; longest spine $1.6-$ I. $7 \times$ apical width of basitarsus. Dorsum of mid- and hindbasitarsus with two preapical spines each. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna III and IV with fimbriate depressions (except laterally), fimbriae appressed basally and fully concealing integument. curving downward apically; setae of sterna V and V1 dense, long (those setae that delimit apical depression no longer than remaining ones). Sternum VIII rounded apically. Volsella: Fig. 43d. Length $7.0-8.0 \mathrm{~mm}$.

Geographic Distribution (Fig. 40).-Senegal to Togo.
Records. - Holotype: ©, SENEGAL: Bayakh 45 km E Dakar, 7 Jul 1991, WJP (CAS). Paratypes: GHANA: Kawampe, $8^{\circ} 30^{\prime} \mathrm{N}, 1^{\circ} 35^{\prime} \mathrm{W}, 45 \mathrm{~km}$ N Kintampo, 2 Feb 1991, WJP (4 8, CAS).
MALJ: Sẻvare, 8 Mar 1981, J W Everts (18, 18 , CAS; 18, 2 8, LUW: 1 \&, 1 S. ZMA).

TOGO: Sokodé. Dec 1982, AP (19, CAS; 2 \&. 1 3, FSAG).
SENEGAL: Bayakh 45 km E Dakar, 7 Jul 1991, WJP (I ס̊, CAS); Kaolack, 18 Jul 1988, AM (AAM); Koumpentoum, Mar 1976, GC (1 8, CAS; 28 , UCD); Toubacouta, $12^{\circ} 42^{\prime} \mathrm{N}, 15^{\circ} 49^{\prime} \mathrm{W}, 16 \mathrm{Feb}$ 1988, AM(18, AAM), Vélingara, 15 May 1983, J. W. Everts (1 \&, LUW; 18, ZMA).

Gastrosericus funereus Gussakovskij
(Figures 45-48)
Gastrosertcus fumereus Gussakovskis, 1931:455, oै. Holotype: \&, Turkmenistan: Anau near Askhabad (ZIN), examined. - Bohart and Menke, 1976:256 (IIsted); Kazenas, 1978:137 (in key): Pulawsk1, 1982:363 (synonymy).
Gastrosericus eremorum de Beaumont, 1955:194, \&. Holotype: \&, Morocco: Tinerhir (MZL), exammed. New synonym - Bohart and Menke, 1956:256 (listed). Gastrosericus apostolt de Beaumont, 1967:322, 8, 8. Holotype: \&, Turkey: Mersin Province: Tarsus (J. Gusenleitner coll., Linz). examined. Synonymized with Gastrosertcus fiencreus by Pulawskı, 1982:363.-de Beaumont, Bytınski-Salz, and Pulawski, 1973:16 (Israel).

Dlagnosis. - In the female of funcreus, the clypeal disk has a transverse or broadly V -shaped carina that is continuous, interrupted mesally, or reduced to a pair of teeth (Fig. 45a-1). Other features are: pronotal side sulcate, gena in most specimens dentate (Fig. 45 g ).

In the male, the vestiture is appressed, the free margin of the clypeal lobe is broadly arcuate and not angulate laterally (Fig. 46a, b), the foretrochanteral notch is deep, and sternal setae are short, even. The males of $a=y x$, chalcthorax, electus, karooensis, and senegalcnsts are similar, but in finercus the preapical rake spines of the forebasitarsus are absent or shorter than the basitarsus width (spines as long as the basitarsus width or longer in the other species). Subsidiary recognition features are: anten-
 only at the very apex), and scutal flange slightly expanded over the tegula and contrastingly concave between expansion and scutal hindcorner.

Description (see also Variation below). - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin broadly, shallowly emarginate, biarcuate in some females. Orbit slightly further from antennal socket than from hindocellar scar in female, almost equidistant in male. Propleuron simple. Thorax linely sculptured, but individual punctures discernible on scutum. Scutal flange minimally expanded adjacent to tegula, contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin 3.0-5.0 $\times$ apical truncation. Recurrent veins interstitial above (Moroccan and Turkmen specimens, male from Oman) or confluent in a short petiole.

Vestiture short, appressed, including setae adjacent to oral fossa, nearly appressed between propodeal side and hindface; partly obscuring mesopleural integument in female, not obscuring in male.

Head black including clypeus and scape (scape translucent apically), mandible yellow or yellowish brown mesally. Thorax black except pronotal lobe, tegula, and humeral plate externally pale yellow. Femora black (brown reddish in some females), narrowly yellow apically; tibiae black or (most specimens) outer side of foretibia and mid- and hindtibial dorsum pale yellow (see also Variation below); tarsi all brown or pale yellow basally.


Figure 47. Gastrosericus funereus, male: a, foretrochanter ( $\times 258$ ), b, bottom of foretrochanteral notch ( $\times 1363$ ).

Gaster black or segments I-III red. Wings hyaline or slightly infumate.
9.-Mandible (Fig. 45h): inner margin with one subbasal tooth, no cleft, and with obtusely angulate preapical expansion (which is lacking in worn specimens). Clypeus (Fig. 45a-c): disk in most specimens with obtuse carina that is continuous or mesally interrupted, straight or broadly V-shaped; in some specimens carina reduced to a pair of transverse teeth; free margin truncate or very shallowly concave, corner well-defined; distance between comers $2.4-2.8 \times$ distance between corner and orbit; corners slightly prominent in some individuals. Distance between hindocellar scar and orbit about equal to scar length. Gena with tooth below midheight (Fig. 45 g ), but tooth evanescent in small specimens. Flagellomere 1: dorsal length $1.5-1.8 \times$ apical width. Pronotum: precollar with lateral, longitudinal carina (carina absent in one specimen from Tarsus), side sulcate. Forecoxa shallowly concave near midlength adjacent to inner margin. Forebasitarsus with 4 (some specimens) or 5 rake spines, length of apical spine $1.1-1.5 \times$ basitarsus width. Foretarsomere IV: length of inner apical spine $0.3-0.4 \times$ apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II setose throughout (holotype of apostoli) or with glabrous, triangular area apicomesally. Setae of pygidial plate thin, inconspicuous except stout on about apical third. Length $5.8-6.5 \mathrm{~mm}$.
f.-Mandible: inner margin without subbasal tooth. Clypeus (Fig. 46a, b): free margin of lobe arcuate, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 1.2 $\times$ scar length. Flagellomere 1: dorsal length 1.1-1.2 $\times$ apical width. Foretrochanteral notch about as long as distance that separates it from trochanteral apex (Fig. 47a), notch bottom covered with appressed setae (Fig. 48b). Forebasitarsus with 03 rake spines (near base, at midlength, and al apex); spine length less than apical width of basitarsus. Dorsum of mid- and hindbasitarsus without preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna without mesal depressions, closely, microscopically punctate throughout; sternal setae short, uniform. Sternum VIII with shallowly concave apical margin (slightly pointed apicolaterally). Volsella: Fig. 46c. Length $5.0-5.5 \mathrm{~mm}$.

Variation. - The only Moroccan female seen differs from other specimens in the tibial coloration: the foretibia is brown except a small yellow spot basally, the midtibial dorsum has a yellow spot basally and a narrow yellow strip on the apical half, and the hindtibial dorsum has a yellow strip that does not extend to the tibial apex.

Four Middle East females are so distinct from average funereus that they warrant a separate discussion. They are characterized by their large size, exuberance of certain structures, inner mandibular margin with obtuse cleft, mesopleural vestiture totally concealing integument, mandible yellow or reddish except dark brown apically, and gaster and hindfemur all or largely red (other characters are as in the Description above). I assign them to funcreus because they appear to form a continuous transformation series with typical specimens of the species.
(1) A female from Mahdah. Oman. Transverse clypeal carina evanescent except laterally, thus forming a pair of prominent teeth (Fig. 45d); lobe broad, distance between corners $3.7 \times$ distance between corner and orbit. Flagellomere I: dorsal length about $2.0 \times$ apical width. Genal tooth larger than in Fig. 45g. Forebasitarsus with 5 rake spines on one leg and 6 on other. Gaster red except terga IV and V largely darkened; femora minimally yellow apically, hindfemur somewhat darkened dorsally; black replaced by red on tibia; tarsi brown red. Length 8.1 mm .
(2) Two females from Abut and Shweib/Madain, United Arab Emirates. Transverse clypeal carina prominent. obtusely V-shaped; lobe unusually broad, distance between comers 4.1 $x$ distance between corner and orbit; free margin of lobe conspicuously, roundly, prominent mesally, straight between prominence and comer (Fig. 45e). Distance between hindocellar scar and orbit about $1.25 \times$ scar length. Flagellomere I: dorsal length about $2.0 \times$ apical width. Propleuron with toothlike projection emerging near middle of its hindmargin and with expanded posterolateral comer; expansion about as large as in synander (see Fig. 119), but irregularly triangular (longest anteriorly) rather than rounded in dorsal view. Forebasitarsus with 5-7 rake spines. Gaster all red; fore- and midfemora largely red, yellow apically; hindfemur all red except for yellow apical spot; black replaced by red on tibiae: tarsi red, yellow basally. Length $6.5-$ 7.0 mm .



Figure 49. (iastrosericus gughac. a. female clypeus ( $\times 60$ ), b, female mandible ( $\times 57$ ) ; c, male clypeus ( $\times 55$ ), d, volsella ( $\times 228$ )
(3) A female from Zerikey area, Turkey. Clypeal free margin conspicuously, roundly prominent mesally, markedly concave between prominence and orbit (Fig. 45f); lobe corners reduced. Flagellomere I: dorsal length $2.2 \times$ apical width. Propleuron expanded posterolaterally into large, irregularly shaped projection which, unlike madecassus or swalei, is oriented ventrad and not laterad. Forebasitarsus with 5 spines on one leg and 6 on other. Gaster red; femora minimally yellow apically, hindfemur largely reddish; tarsi red. Length 7.9 mm .

Geographic Distribution (Fig. 48).-Gastrosericus funereus is known from two widely separated areas. One is Morocco (only one specimen found to date), the other includes northwestern Egypt, Israel, southern Turkey, Arabian Peninsula, Iran, Turkmenistan, Tajikistan, Pakistan, and India.

Records-COMMONWEALTH OF INDEPENDENT STATES: Tajikistan foothills of Mt. Aktau in Dushanbe area (19, VLK); Garauty on Vakhsh River in Kolkhozabad distnct ( $2 \mathrm{~s}, \mathrm{VLK}$ ). Turkmenistan: Anau, 10 km E Askhabad (holotype s of funereus, Z1N), Kerkı (1 8, Z1N).

EGYPT: $18-25 \mathrm{~km}$ W Suez ( 18 , USNM).
INDIA: Uttar Pradesh: Kotdwara in Garhwal District (18, ZMK).
IRAN: Fars: Dana Namak, 27 km E Shiraz ( 19,1 o, CAS).
ISRAEL: Wadı Raman (de Beaumont, Byıınskı-Salz, and Pulawskı, 1973).
MOROCCO: Tinerhur (1 \& , holotype of eremorum, MZL).
OMAN: Mahdah ( 1 \&, KMG), Rostag ( 1 ふ́, KMG), Wad! Khabb ( 1 \&, KMG).
PAKISTAN: Baluchistan: Hazarganıi Chiltan National Park 20 km SW Quetta
( 3 \&, CAS). Punjab: Bahawalpur ( 2 \&, 28 , CAS), Faısalabad ( 18 , UCD).
TURKEY: Diyarbahir: between Butlis and Zerikey, circa $37^{\circ} 55^{\prime} \mathrm{N}, 41^{\circ} 17^{\prime} \mathrm{E}(1$
9. KMG). Mersin: Mut (1 q, MS), Tarsus (I \&, JG, holotype of apostoh; paratypes of aposioli: 2 \&. CAS, JG, 1 \&. 28, MZL).
UNITED ARAB EMIRATES: Abu Dhahi International Airport. $24^{\circ} 26^{\circ} \mathrm{N}$, $54^{\circ} 38^{\prime} \mathrm{E}(1$ \&, KMG), Shwerb Madain (18. CAS), Wadı Bih (18, CAS).

## Gastrosericus guigliae de Beaumont

(Figures 49-51)
Gastrosericus guighae de Beaumont, 1956:203.9. Holotype:?, Libya: Tripolitana: Ganan (BMNH), examined. - not Pulawsk1, $1964: 111$ (actually Gastrostricus phepheros), Bohart and Menke, 1976:256 (listed)

Diagnosis. - Gastrosericus guigliae has a shiny, triangular elevation on the propleuron (as in Fig. 143b), setae are long adjacent to the oral fossa (setal length about equal to basal width of mandible), and appressed on the scape and hindfemur. The female has a distinctive clypeus: free margin obtusely pointed mesally and angulate between the middle and lateral sections (Fig. 49a); and the inner mandibular margin without a preapical tooth (Fig. 49b) is a subsidiary recognition feature. The male is unique in the genus in having the hypostomal carina expanded adjacent to mandibular base (Fig. 50a), and the yellow, sharply pointed clypeus (shared with capensts) helps in identification.

DESCRIPTION. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin shallowly emarginate in fermale but rounded in male. Clypeal surface similar as in phepheros, more convex mesally than in drewseni, capensis, and


Figure 50. Gastrosericus gughae, male: a, postenor surface of head with arrow showing expanded hypostomal canna ( $\times 56$ ); $b$, foretrochanter ( $\times 194$ ).
waltlii. Orbit closer to hindocellar scar than to antennal socket. Propleuron near hindmargin with shiny, triangular elevation that is slightly rising posterad. Scutum and mesopleuron with well-defined punctures or mesopleural punctures compressed against each other, ill-defined. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 2.2-2.8 $\times$ apical truncation. Recurrent veins separate or interstitial above.

Setae sinuous on thorax and also adjacent to oral fossa, where they are $0.7-0.8 \times$ basal width of mandible; almost entirely obscuring mesopleural integument; appressed on scapal and hindfemoral venters; frontal setae appressed or some setae semierect on midline above antennal sockets.

Head and thorax black except the following are pale yellow: mandible (except apically), clypeus, scape (except dorsally in female), tegula, and humeral plate. Gaster red. Fore- and midfemora dark brown except yellow apically, hindfemur red except narrowly yellow apically. Tibiae red, pale yellow dorsally or (forefemur) on outer side. Tarsi red. Wings hyaline.
9.-Mandible (Fig. 49b): inner margin without subbasal teeth, cleft, or preapical tooth. Clypeus (Fig. 49a): disk without teeth or carinae: free margin of lobe arcuate, corner well-defined, distance between corners $2.0 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about equal to scar length. Gena simple. Flagellomere I: dorsal length 1.7 $\times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 7 rake spines; length of apical spine $2.4 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine $0.8-1.2 \times$ apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum 11 apicomesally with glabrous, triangular area. Pygidial plate covered with stout setae. Length 7.3 mm .
of.-Mandible: inner margin with no subbasal tooth. Clypeus (Fig. 49c): lobe sharply pointed, not angulate laterally, forming single curved line with rest of elypeal margin. Hypostomal carina expanded adjacent to mandibular base (Fig. 50a), expansion round or angulate. Distance between hindocellar scar and orbit about $1.1 \times$ scar length. Flagetlomere 1: dorsal length $1.6-1.7$
apical width. Foretrochanteral notch not sharply delimited distally, but longer than distance that separates it from trochanteral apex (Fig. 50b); bottom with no particular structure.

Forebasitarsus with 5 or 6 rake spines; longest spine $2.0 \times$ apical width of basitarsus. Dorsum of midbasitarsus and of hindbasitarsus each with two preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely setose. Stema III and IV (except laterally) with fimbriate depressions, fimbriae appressed basally and fulty concealing integument, curving downward apically: sterna V and VI with usual, straight setae that delimit apical depression, and with shorter, dense, erect setae. Sternum V11I rounded apically. Volsella: Fig. 49d. Length $8.7-9.0 \mathrm{~mm}$.

Geographic Distribution (Fig. 51).-Egypt, Libya.
Records - EGYPT: Al Jizah (= Ghıza): Dahshour (1 ơ, USNM). Al Qahirah (= Cairo): W'adı Dıgla (1 \&. NHMW). Wadı el Tıh ( 4 \&, 1 b, CAS; 1 \&, MZL, paralype, 11 क. 1 ठ。. NHMW). Al Qanal Fayed (1 8, JG).

LIBYA Tripoitania Ganan (19, BNINH, holotype of grughae).

## Gastrosericus herero sp. n.

## (Figures 51-53)

Derivation of Name. - Named after the Herero people of Namibia; a noun in apposition to the generic name.

Diagnosis. - Gastroscricus herero is known only from Namibia. The femate has a sinuate clypeal lobe with a well-defined corner (Fig. 52a, b), a conspicuous genal tooth (Fig. 52d), and a deeply sulcate pronotal side. Several species are similar (bambara, braunsi, pulchellus, and wicolor), but in hercro the median portion of the clypeal free margin is wider and less strongly arcuate (Fig. 52a, b), the adductor interspace on inner mandibular face is conspicuously concave basally, the pygidial plate has only a few setae at the apex (plate with numerous setae in the other species except braunsi), and the forecoxal venter has a long expansion anteriorly (Fig. 52e); the expansion is short or absent except in hraunsi. An all red gaster is a subsidiary recognition feature. Unlike braunst, the female of herero has no additional carina between the genal tooth and hypostomal carina.

The male has appressed setae on the head; an all yellow clypeus with an acutely pointed lobe; the scutal flange is present. evenly curved throughout: and the terga have no yellow mark-

ings. These features are also found in lepidus and many umcolor. but herero differs in having a largely red rather than black gaster. The apically emarginate sternum VIII is an additional recognition feature.

Description. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin roundly emarginate. Orbit equidistant from antennal socket and hindocellar scar in female, slightly further from hindocellar scar than from antennal socket in male. Propleuron simple. Thorax finely sculptured, but individual punctures discernible on scutum. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.4$3.8 \times$ apical truncation. Recurrent veins mostly confluent above in a short petiole, interstitial in some specimens.

Setae appressed on head and thorax including those adjacent
to oral fossa (except semierect between propodeal side and hindface), obscuring mesopleural integument.
Head black but clypeus yellow: scapal venter yellow (only apically so in female). Mandible yellow, black apically. Thorax black, but pronotal lobe, tegula, and humeral plate pale yellow. Gaster red, brown apically in most males. Femora: see below. Tibiae ferruginous ventrally and yellow dorsally; foretibia yellow on outer side. Tarsi reddish in female, red or yellow in male. Wings almost hyaline.
9.- Mandible (Fig. 52c): inner margin with basal tooth but without cleft or preapical tooth. Clypeus (Fig. 52a, b): disk with obtuse, median carina that is absent basally and apically; free margin markedly convex mesally and markedly concave laterally (convex portion larger than concave one), corner well-de-



fined; distance between corners 2.1-2.3 $\times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $1.4 \times$ scar length. Gena with tooth al level of mandibular base (Fig. 52d); tooth adjacent to occipital carina. Flagellomere I: dorsal length $1.6-1.7 \times$ apical width. Pronotum: precollar carinate laterally side deeply sulcate. Forecoxa concave near inner margin. expanded into prominent, oblong tooth near anterior margin (Fig. 52e). Forebasitarsus with 5 five rake spines; length of apical spine $1.2 \times$ apical width of basitarsus. Foretarsomere 1 V : length of inner apical spine $0.25-0.4 \times$ apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum Il asetose apicomesally. Pygidial plate sparsely punctate. with mieroscopic, sparse setae and in most specimens with a lew stout setae at apex. Length $7.0-8.0 \mathrm{~mm}$.

Forefemur black basally, yellow apically; midfemur largely red but black basally and yellow apically; hindfemur red, yellow apically (yellow portions of all femora longer ventrally than dorsally).
f. - Mandible: inner margin without subbasal tooth. Clypeus: free margin of lobe sharply pointed, not angulate laterally, forming single eurved line with rest of clypeal margin. Distance between hindocellar sear and orbit about $1.5 \times$ sear length. Flagellomere 1: dorsal length $0.8 \times$ apical width. Foretrochanteral notch about as long as distance that separates it from trochanteral apex (Fig. 53a); notch bottom uniformly covered with suberect setae (Fig. 53b). Forebasitarsus with 3 rake spines; longest spine equal to apical width of basitarsus. Dorsum of mid- and hindbasitarsus without preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna without mesal depressions, microscopically, closely punctate throughout; sternal setae short, uniform. Sternum VIII markedly emarginate apically. Volsella: Fig. 52f. Length 4.8 5.8 mm .

Femora black, with yellow apical spot that is longer ventrally than dorsally.

Geographic Distribution (Fig. 51).-Namibia.


Figure 53. Gastrosericus herero, male: a. foretrochanter ( $\times 284$ ); b, bottom of foretrochanteral nolch ( $\times 790$ ).

Records. - Holotype: \&, NAMIBIA Karibib District: 62 km E Kanbib, 20 Feb 1990, WJP (CAS). Paratypes: NAM1BIA: Karibib District: same data as hololype ( 3 ㅇ, CAS), MS (1 f, MS): 43 km E Karibıb, 20 Feb 1990, MS (29, 2 8. MS), WJP
 8, CAS); same locality, 28 Feb 1990, MS (18, MS), WJP (29, 28, CAS); 20 km
子, MS); 23 km N Kanbib, 27 Feb 1990, WJP (2 2 , CAS), 17 km W Usakos, 21 Feb 1990, WJP (2 ㅇ, 3 8, CAS). Okahandja District: Okahandja, 2-4 Feb 1972, Southern African Expedition (5 8, BNINH); Okahandja, 19-27 Dec 1927, R.E. Turner ( 1 8, BMNH); 17 km W Okahandja, 19 Feb 1990, MS ( 1 8, 2 b, MS), WJP (1) 9, CAS). Outjo District Etosha National Park al $19^{\circ} 04^{\prime} \mathrm{S} .14^{\circ} 43^{\prime} \mathrm{E}(19$, SMNW. type number T-867). Otjiwarongo District: 20 km NE Otılwarongo, 13 Feb 1990, MS (18, MS). Rehoboth Districi 15 km N Kalkrand, 14 Feb 1990, MS (1 ㅇ. 3 8\%, MS): 27 km N Kalkrand, 14 Feb 1990, WJP (1 8, CAS); 7 km N Rehoboth, 7 Feb 1990, WJP ( 18. CAS); 23 km N Rehoboth, 15 and 17 Feb 1990, MS (28. MS), WJP ( 1 б. BMNH: 2 ㅇ, 8 万, CAS). Windhoek District $36 \mathrm{~km} \mathrm{E} \mathrm{Windhoek}$,16 Feb 1990, WJP (28. CAS).

Gastrosericus hombori sp. n.
(Figures 51, 54, 55)
Derivation of Name. - Hombori, a locality in Mali where the holotype was collected. The name means "it is nice weather today" in the Songhai language and is used here as a noun in apposition to the generic name.

Diagnosis. - The female of hombori has a unique combination of stout but relatively sparse pygidial setae (Fig. 54d) and yellow apical depressions of terga I-V, and the spinose venter of the apical tarsomeres (Fig. 55a, b) is a subsidiary recognition feature. In the male, the apical depressions of terga I-V are also yellow. The males of hucidus and vanthophilus are similar but in hombori the free margin of the clypeal lobe is arcuate (Fig. 54 e ), whereas it is pointed in the other two (Figs. 67d; 148h-j).

Description. - Mandible with notched posterior margin, abductor ridge absent. Labrum: free margin emarginate. Orbit closer to hindocellus than to antennal socket. Posterior margin of head more arcuate than in most other species (Fig. 44c). Propleuron simple. Thorax finely sculptured, individual punctures barely discernible on scutum. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 1.9-2.0 $\times$ apical truncation. Recurrent veins separate or interstitial above.

Vestiture appressed, including setae adjacent to oral fossa and those between propodeal setae and hindface; obscuring mesopleural integument.

Head black, but mandible (except apically), clypeus, and scape (except dorsally) pale yellow. Thorax black, but pronotal lobe, tegula and humeral plate pale yellow. Gaster red. apical depressions of terga I-V (I-VI in male) pale yellow; red replaced by dark brown on male terga IV-VI. Male coxae partly yellow. Femora red (red partly or entirely replaced by black on foreand midfemora), with yellow apical spot that is markedly longer ventrally than dorsally. Tibiae red, yellow dorsally (outer side yellow on foretibia); all yellow basally and apically in male. Tarsi: female foretarsus yellow, slightly darker apically, midand hindtarsi reddish except yellow basally; male tarsi pale yellow. Wings hyaline.
9.- Mandible (Fig. 54b): inner margin with obtuse basal tooth, without cleft or preapical tooth. Clypeus (Fig. 54a): disk without teeth or carinae; free margin of lobe arcuate or slightly sinuate; distance between corners about $4.8 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $0.8 \times$ scar length. Gena simple. Flagellomere I: dorsal length $1.7 \times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 6 rake spines ( 5 on one leg in some specimens); length of apical spine $2.0-2.1 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine $0.7-0.9 \times$ apical width of tarsomere. Venter of each tarsomere V spinose (Fig. 55a, b), many spines placed along lateral margin and visible in dorsal view. Sternum II apicomesally with glabrous, triangular area. Pygidial plate covered with stout, sparse setae (Fig. 54d). Length $5.5-6.5 \mathrm{~mm}$.
d.- Clypeus (Fig. 54e): free margin of lobe arcuate, not angulate laterally, forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 1.1 $\times$ scar length. Flagellomere I: dorsal length I.1-1.2 $\times$ apical width. Foretrochanteral notch longer than distance that separates it from trochanteral apex (Fig. 55c); notch bottom covered with appressed setae (Fig. 55d). Forebasitarsus with 3 or 4 rake spines; longest spine $1.7 \times$ apical width of basitarsus. Dorsum

 e. male clypeus ( $~ 49$ ), f, volsella ( $\times 286$ )
of midbasitarsus with one to three preapical spines (mostly two), dorsum of hindbasitarsus with no to two such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna without depressions, shortly, evenly pubescent. Sternum VIll rounded apically, Volsella; Fig. 54d. Length $4.3-4.8 \mathrm{~mm}$.

Life History. - 1 noticed a female digging her nest at the outskirts of Gao at I1:56, on 14 August 1991. The nest site was in sand, several meters away from the nearest plant. The female acted rapidly, using her forelegs and mandibles to remove sand and small pebbles (some larger than her head). She reappeared at the surface every $2-3$ seconds, but sometimes remained inside up to 30 seconds. A round mound of extracted material, about 3 cm in diameter, accumulated in front of the entrance. Periodically the female leveled the mound using her forelegs. She started digging at several places near the nest entrance at $12: 15$, as if to start additional galleries (each one was actually no more than a shallow concavity). She entered the nest at 12:20 and closed the enirance from the inside, as if to spend the rest of the day there. This behavior was not caused by inclement weather, as the day was hot and cloudless (although it had rained
heavily the previous night and the soil was still wet just under the surface). I dug out the female at 12:30.

Geographic Distribution (Fig. 51).-Mauritania and Mali.
Records. - Hololype: MALI Hombori, 11 Aug 1991, WJP (CAS). Paratypes: MALI (all spectmens collected in 1991): Gao. 14.Aug. MS (28.68. MS) and WJP (18, 1 8, CAS): 10 km N Gao, 15 Aug, MS (18. 18 , MS) and WJP ( 38, CAS); 30 km W Gao, 15 Aug, MS ( 158,88 , MS) and WJP ( 59. CAS); 158 km W Gao, 13 Aug, WJP ( 18, AAM1. 38,5 d, CAS) 180 km NW Gao. 13 Aug. MS ( 88.2 8. MS); Hombori, 11 Aug, MS (18, 1 8. MS) and WJP (18. CAS). 10 km E Hombon, 13 Aug, MS (28, 3 8. MS); 25 km E Hombori, 13 and 18 Aug, WJP (28. +5. CAS).

MAURITANIA (all specimens collected by WJP in 1993): 20 km NE Akjoujt, $25 \mathrm{Oct}(18, \mathrm{CAS}) ; 20 \mathrm{~km}$ NE Aleg, 3 Nov ( $18, \mathrm{CAS}$ ), 25 km SW Moujéria ( 1 \&. CAS), Tamoureı Naaj cırca 30 aı km NE Mouérıa (l \&, CAS).

## Gastrosericus incisus sp. n.

(Figures 34, 56)
Derivation of Name. - Incisus, a Latin masculine adjective, meaning incised or notched; with relerence to the clypeus shape. Diagnosis.-Gastrosericus incisus is unique in having a mesally notched clypeus (Fig. 56a, d). Like hombon, moricet.


Figure 55. Gastrosertcus hombort: a, female hindtarsomere $V$ ventrally ( $\times 237$ ), b, same $(\times 474$ ), c, foretrochanteral notch of male ( $x 356$ ), d, bottom of trochanteral notch ( $\times 798$ ).
and sanctus, the female pygidial plate is covered throughout with stout setae and the apical tarsomeres are spinose basoventrally. The relatively shallow foretrochanteral notch of the male (Fig. 560 ) is a subsidiary recognition feature.
Relationship to Gastrosericus moricei.-Except for the shape of the clypeus, incisus is almost identical to moricei. Possibly incisus is an extreme variant of the latter, but l prefer to regard it as a separate species because I have seen no intermediates. The fact that the male and female (each from a different area) have basically the same clypeal shape suggests that incisus is a valid species. Also, the volsellae are quite different in the two species (compare Figs. 56 g and 78i).

Description. - Mandible with notched posterior margin, abductor ridge absent. Labrum: free margin triangularly emarginate. Orbit closer to hindocellus than to antennal socket (only
insignificantly so in male). Propleuron simple. Thorax microsculptured, without well-defined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 2.2 $x$ apical truncation. Recurrent veins narrowly separate.

Vestiture appressed, including setae on vertex and adjacent to oral fossa, almost totally obscuring mesopleural integument.

Head black, but mandible (except apically), clypeus, and scapal venter pale yellow. Thorax black, but pronotal lobe, tegula, and humeral plate pale yellow. Gaster red. Femora black, yellow apically (narrowly so in female, broadly in male). Tibiae and tarsi: see below. Wings hyaline.
9.- Mandible (Fig. 56c): inner margin with basal tooth and cleft but without preapical tooth. Clypeus (Fig. 56a, b): disk without teeth or carinae; free margin of lobe arcuate, emarginate mesally, corner well-defined; distance between corners $3.5 \times$


Figlire 56 Gustrosericus mitisus: a, female head ( $\times 32$ ); b, female clypeus ( $\times 62$ ); c, female mandible ( $\times 79$ ); d, male head ( $\times 36$ ), e, male clypeus ( $\times 88$ ); f, male foretrochanter $(\times 228), \mathrm{g}$, volsella $(\times 238)$.
distance between eorner and orbit. Distance between hindocellar sear and orbit about $0.6 \times$ scar length. Gena simple. Flagellomere I: dorsal length $1.8 \times$ apical width. Pronotum: precollar not cannate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 rake spines: length of apical spine $2.5 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical
spine about $1.0 \times$ apical width of tarsomere. Tarsomeres $V$ each with one basoventral spine. Sternum II glabrous apicomesally. Pygidial plate covered with stout setae which largely conceal integument. Length 7.0 mm .

Foretibia light brown, pale yellow on outer side; mid- and hindtibiae light brown, pale yellow basally. Tarsi brown.


Figure 57. Gastrosericus karooensis: a. lemale clypeus ( $\times 86$ ); $\mathbf{b}$, lemale mandible ( $\times 88$ ), $c$, male clypeus ( $\times 102$ ); d, volsella $(\times 244$ ).

ס.-Mandible: inner margin with subbasal tooth, emarginate distad of tooth. Clypeus (Fig. 56d, e): free margin of lobe arcuate, emarginate mesally, with vestigial corner; distance between corners about $2.0 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $0.7 \times$ scar length. Flagellomere I: dorsal length $1.2 \times$ apical width. Foretrochanteral notch longer than distance that separates it from trochanteral apex, its bottom with several rows of erect setae (Fig. 56f). Forebasitarsus with 3 rake spines: longest spine $1.1 \times$ apical width of basitarsus. Dorsum of midbasitarsus with one preapical spine, dorsum of left hindbasitarsus (in the single male studied) without such spines, dorsum of right hindbasitarsus with one rudimentary spine. Inner claws of all tarsi as large as outer claws. Pygidial plate densely setose. Sterna without mesal depressions, microscopically, closely punctate throughout; sterna 111 and IV with conspicuous, appressed setae which are markedly longer than those on sternum II. Sternum VIII rounded apically. Volsella: Fig. 56 g . Length 5.6 mm .

Tibiae pale yellow, brown red ventrally (foretibia brown red on inner side). Foretarsus yellow, mid- and hindtarsi yellow brown.

Geographic Distribution (Fig. 34).-Southern India, Sri Lanka.

Records.-Hololype: \&, INDIA: Tamil Nadu: Tranquebar, Aug 1948, P. S. Na1han (USNM). Paratype: SRI LANKA: Mannar District Ma Villu, 16-19 Sep 1980. KVK, P. B. Karunaratne, T Wijesinhe, L. Jayawickrema, V. Gunawardane ( 1 ơ, USNM).

## Gastrosericus karooensis Brauns

(Figures 57-59)
Gasterosertcus [sic] karooensts Brauns, 1906:52, 9 . Holotype: \&, South Afnca: Willowmore (TMP), examined. - Brauns, 1911:239 (nesling in sand). Arnold. 1922:116 (redescription, as karroeensis). 1930:2 (1sted); Bohart and Menke. 1976:256 (hsted).
Gasterosericus[sıc] oraniensus Brauns, 1906:51.8. Holotype: s, South Africa: Bothaville (TMP), examined. New synonym - Brauns, 1911:239 (nesting in sand); Amold. 1922:115 (redescription), 1930:2 (listed); Bohart and Menke. 1976:256 (lisled).
Gastrosericus divergens Amold, 1922:119.8 (as Brauns's MS name). Holo1ype: 8. Zimbabwe: Sawmills (TMP), examined. New synonym. - Amold, 1930:2 (11sted), Bohart and Menke, 1976:256 (listed). 279 (male sternum VIlI illusirated).

Diagnosis. - Gastrosericus karooensis is difficult to define because of color variation and lack of prominent morphological features. In the female, the clypeal disk has no teeth or carinae, the free margin of the lobe is broadly arcuate (Fig. 57), the scutal flange is evenly curved throughout or nearly so, the pygidial setae are inconspicuous (at most, two to four apical setae are stout), and the scape is all black or translucent apicoventrally (no yellow markings). Several other species are similar, but $k a$ rooensis differs as follows: clypeal lobe broad, distance between corners 2.3-2.5 $\times$ length of clypeal midlength (about 1.5 in eurypus); head low, distance between edge of antennal socket and edge of midocellus $1.1-1.2 \times$ least interocular distance ( 1.4 in siamensis); pygidial plate of most specimens with two to four stout setae at apex (with no stout setae in siamensis); and sternum II setose throughout or narrowly glabrous apically (gla-


Figure 58. Gastroserteus karnensts, male: a, foretrochanter ( $\times 346$ ); b, bottom of forelrochanteral notch ( $\times 1038$ ).
brous zone up to two midocellar diameters long, while markedly longer in stamensis and tissa). Unlike sobrimus, the foretarsomeres 1 and 11 are not expanded apicolaterally, and the length of foretarsomere III is about $1.3 \times$ apical width (rather than equal to width). Some Namibian females resemble electus and senegafensis in having a red gaster and red, apically yellow femora. Such individuals differ by their short inner apical spine of foretarsomere 1V (length equal to $0.4-0.5$ of tarsomere's apical width rather than 1.2-1.5); also, the scape of electus is yellow ventrally.

In the male, the vestiture is appressed, the free margin of the clypeal lobe is broadly arcuate and not angulate laterally (Fig. 57 c ), the scape has no yellow marking (all black or translucent apicoventrally), and sterna are covered with short, even pubescence; the forecoxa of many specimens is angulate posterolaterally. The males of baobabicus, chalcithorax, and funereus are similar, but in karooensts the clypeal lobe is slightly more rounded mesally (compare Figs. 20d, e; 27d; 46a, b; and 57c). In addıtion, the antenna of karooensis is black or dark brown, the antennal sockets are separated by a distance equal to about 1.4 socket diameter, the longest spine of the forebasitarsus is equal to basitarsal width or slightly longer, the gaster of many specimens is black, and the foretrochanteral notch of nearly all specimens has no erect setae (Fig. 58a). In baobabicus, the antennal sockets are separated by a distance equal to about 1.7 socket diameter, and the gaster is red; in chalcithorax; the gaster is red basally, and the foretrochanteral notch has a row of erect microsetae (Fig. 28a); in funereus, the forebasitarsus either has no preapical rake spines or the spines are shorter than the basitarsal width.

Description. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin biarcuate or shallowly, broadly emarginate. Orbit closer to hindocellar scar than to antennal socket (slightly so in male). Propleuron simple. Thorax finely sculptured, but individual punctures discernible on scutum. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 2.7-4.6 $\times$ apical truncation. Recurrent veins narrowly separate, interstitial above, or (most specimens) confluent in a short petiole.

Vestiture short, appressed, including setae adjacent to oral fossa; also setae between propodeal side and hindface practically appressed; mesopleural setae partly obscuring integument.

Head black, including scape. Mandible yellow or reddish yellow except black or dark red apically (also black basally in some specimens). Thorax black, pronotal lobe yellow posteriorly in many specimens; tegula and humeral plate brown or yellow anteriorly. Gaster and legs: see Variation below. Wings almost hyaline.
8.- Mandible (Fig. 57b): inner margin with two subbasal teeth separated by well-defined cleft (distal tooth ill-defined in some specimens), without preapical tooth. Clypeus (Fig. 57a): disk without teeth or carinae, evenly sculptured or with subapical, glabrous area (see Variation below for details ); free margin weakly, evenly arcuate, corner well-defined; distance between corners 2.3-2.5 $\times$ distance between corner and orbit. Distance between hindocellar scar and orbit about one scar length. Gena simple. Flagellomere 1: dorsal length 1.5-1.6 $\times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 rake spines; length of apical spine $1.4-1.8 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine $0.4-0.5 \times$ apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II pubescent throughout or with a glabrous zone along hindmargin (length of glabrous zone about one midocellar diameter). Pygidial plate with thin, inconspicuous setae except two to four apical setae stout in most specimens (no stout setae in one female from Sawmills, Zimbabwe). Length $5.5-6.4 \mathrm{~mm}$.
d.- Mandible: inner margin without subbasal tooth. Clypeus (Fig. 57c): free margin of lobe arcuate, not angulate laterally, forming single curved line with rest of clypeal margin; disk in many specimens with poorly delimited, glabrous swelling along midline. Distance between hindocellar scar and orbit about equal to scar length. Flagellomere I: dorsal length $1.4-1.5 \times$ apical width. Foretrochanteral notch, in most specimens, Ionger than distance that separates 11 from trochanteral apex (Fig. 58a), and bottom covered with appressed, stout, setae that are oriented toward trochanter`s base (Fig. 58b); in some (but not all) specimens from Karibib District, however, the notch is shallower,


Figure 59. Collecting localities of rastrosericus karoomens and lephdus. The combined symbols indicate that two or three forms occur in one locality
shorter than the distance that separates it from the trochanteral apex, and with a row of erect setae. Forebasitarsus with 3 or 4 rake spines ( 5 spines present on one leg in one specimen examined): longest spine equal to apical width of basitarsus or slightly longer. Dorsum of midbasitarsus with one or two preapical spines, dorsum of hindbasitarsus with no or one such spine. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate, setose (but setae not concealing integument). Sterna not depressed mesally, closely, minutely punctate throughout; sternal setae short, uniform. Sternum V111 rounded, narrowly truncate, or scarcely to deeply emarginate apically. Volsella: Fig. 57d. Length 4.2-6.0 mm.

Variation. - Gastrosericus karooensis varies considerably in color and also in some morphological characters, as described below. Three main color forms can be recognized:
(1) In most specimens, the gaster and the femora are black (except femora narrowly yellow apically); tibiae black or dark brown, partly yellow (but only hindtibia with yellow markings in some females): foretibia yellow on outer side (black apically in some specimens), mid- and hindtibia yellow dorsally (yellow color not extending to apex in female). In the female, the clypeal disk is flat, setose throughout (as in the holotype of divergens) or with a subapical, glabrous area (as in the holotype of karooensis) that can be round, elongate or triangular, about equal
to midocellus in size or markedly larger; in specımens with a glabrous clypeal area, the propodeal side along the metapleural suture is somewhat shinier, with a few well-defined punctures. Both elypeal states can occur within a single population (e.g., in Rundu, Namibia, and Pafuri, South Africa), and 1 regard them as individual variants of one species.
(2) In some specimens (including the holotype of oraniensis), the gaster is red basally, and the femora and tibiae are black (except for yellow tibial markings), as in form I; the female tarsi are dark brown. In the female, the clypeal disk is all flat and setose. The amount of red on the gaster varies as follows: a. tergum I red basally and apicolaterally, remainder black, b. tergum I red except for a black apicolateral spot on each side. c. tergum I all red, d. tergum I red, tergum II black except narrowly red basally, e. tergum I red, tergum II red, with black lateral spot, f. terga I and 11 all red, g. terga I-III red. This variation suggests a full intergradation to form 1. Both forms 1 and 2 have been found together in several localities in Namibia. e.g.. 20 km NE Otjiwarongo, 23 km N Rehoboth, and in Rundu.
(3) In some Namibian specimens the red areas are even more extensive than in form 2, and most of them also have more extensive yellow areas on the legs; the black is replaced by red on the tibiae. This category is rasher heterogeneous and difficult to characterize simply. Typically in the female, the gaster is all red or terga III-VI are dark brown; the forefemur is black, with yellow apical spot: midfemur black basally, red apicodorsally, and yellow apicoventrally; hindfemur largely red, black basally, yellow apicoventrally; tarsi red; clypeal disk all flat and setose. One female ( 9 km S of Rehoboth) has an all red gaster, but no yellow on femora (yellow replaced by red). One of the four females collected 65 km SW of Usakos has an all red gaster, and the femora all black (only the very tip yellow). Male tergum I to terga I-III are red, as well as sternum II (all sterna red in several specimens); femora black basally, yellow apically (in some specimens, black partly replaced by red on midfemur and largely replaced by red on hindfemur); foretarsomeres I and II yellow, III-V contrastingly black; midtarsomeres I and II yellow, 111-V brown; hindtarsomeres I and 11 reddish, remainder brown. The foretarsus is all yellow in two males collected 23 km S Rehoboth, the midtarsus yellow in one and brown in the other specimen, and the hindtarsus brown.

Life History.-I briefly observed a female digging her nest in a coarse sand near the lake shore at Kariba, Zimbabwe, on 13 February 1995. She walked into an open burrow that she had already started and reappeared tail first a few seconds later with a sand grain in her mandibles. She then walked briskly backwards for $2-3 \mathrm{~cm}$, dropped her load, and walked toward the burrow again. This sequence was repeated many times before 1 eaptured the specimen.

1 collected a female walking with her prey 11 km NE Nyamandhlovu, Zimbabwe, on 24 February 1995. The prey, an acridid nymph 12.5 mm long, was determined as Platypternodes sp. (Gomphocerınae) by Dr. H. Kriegbaum.

Geographic Distribution (Fig. 59).-Africa south of the equator.

Records. - (no number: color form 1, 2 and 3 refer to respective color forms): ANGOLA. Porto Alexandre ( $3: 2$ \& BMNH).

BOTSWANA. Moremı Reserve. $19^{\circ} 23^{\prime} \mathrm{S}, 23^{\circ} 33^{\prime} \mathrm{E}(1 \%, \mathrm{BMNH})$, Serowe ( 2 a, CAS; 29, NCIP. 2 9, USNM; 8 9, 3 8, ZMK).

CONGO: 30 km N Brazzaville on road 2(28. 3 8́, AAM; 18,28, CAS), Dıoué, Brazzaville (2 8, AAM).

LESOTO: Mamathes ( 3 s, 4 s. AMG: 18, 2 of, CAS).
MALAWI: Chitıpa (18, USU).
MOZAMBIQUE: Mapulo: Rıkatla (19, ZMA).
NAMIBIA: Damaraland: Khorixas (3:19, MS). Grootfonlein District: 30 km NE Grootfonteın ( 10 \&, 9 を, CAS; 78,18 , MS), 40 km NE Grootfontein ( $18 . \mathrm{JG}$ ), 80 km NE Grootfontein ( $38,3 \mathrm{~s}, \mathrm{CAS} ; 48.4 \mathrm{~s}, \mathrm{MS}$ ), 90 km NE Grootfontein ( \&, 1 \&, MS), Meteorite ( 18,1 s, MS). Karibib District Amerb Farm 19 mi NW Kanbib ( $3: 2$, BMNH); 62 km E Karibıb ( $18, \mathrm{MS}, 3: 18, \mathrm{CAS}$ ), 43 km E Karibıb 128, MS, 3:18, 28, CAS, 28, $18, \mathrm{MS}), 15 \mathrm{~km} W$ Karibıb (3: 28, CAS, $18,18$. MS), 17 km W Usakos: (3: 18, MS), 50 km SW Usakos ( $3: 2$ Q, CAS), 65 km SW Usakos (3: 48, 4 b, CAS; 28, 5 8, MS) Kavango Gebied Rundu ( 58,3 8, CAS; $18, \mathrm{JG} ; 9$ ㅇ, 3 o, MS, 2: 10 \&, CAS, 28, JG; 88,1 o, MS), 25 km E Rundu ( 18 。, MS). 30 km E Rundu ( 18 , GS). 40 km E Rundu ( $38, \mathrm{MS}$ ). 60 km E Rundu ( 18. JG, $18,18, \mathrm{MS}$ ), 100 km SW Rundu ( $18, \mathrm{CAS}, 18, \mathrm{JG} ; 28,18$, MS). Okahandja
 (28,18, CAS; 3:1 5. CAS), 17 km W' Okahandja ( 18, CAS; 18, MS). Otjiwarongo District. 15-20 km NW Otıwarongo(18.CAS, $2: 28, \mathrm{MS}), 20 \mathrm{~km}$ NE Otılwarongo (28, CAS, 2: 28, 1 8, CAS). Rehoboth District. 15 km N Kalkrand (3:18, 18 , CAS, 28, MS), 9 km S Rehoboth (3: 18, CAS; 2 \&, MS), 23 km N Rehoboth (2 8, CAS, 2: 18, CAS, $3: 18,38$, CAS, $38, \mathrm{MS}$ ). Tsumeb District 30 km E Namutoni (18.28. CAS), Onguma Farm $55 \mathrm{mı}$ NW Tsumeb (18, BMNH), 10 km SE Tsumeb ( 7 o̊, CAS, 18,1 8., MS), 25 km SE Tsumeb (28, JG, 28, MS). Windhoek District Bismarck River 30 km E Windhoek ( 2 3., CAS. MS), 9 km ESE Seets ( $)$ 8, AMNH), $29 \mathrm{~km} \operatorname{ESE} \operatorname{See} 1 \mathrm{~s}(2: 18$. AMNH), 37 km N Windhoek ( 3 \&, CAS; 3 \&, MS), 8 km S Windhoek ( 18,28 . FSCA), 28 km S Windhoek ( 18, CAS).

SOUTH AFRICA: Cape Province Aliwal North ( 29,1 , BMNH), Queensiown (18, BMNH), Willowmore ( 18 , TMP, holotype of harooenses). Nalal: Mkuzı in Zululand ( 1 \%, NCIP), Ndumu Game Reserve ( 18,3 8. UCD), Witsand Farm near Roaning Sands at $28^{\circ} 32^{\prime} \mathrm{S}, 22^{\circ} 30^{\prime} \mathrm{E}(2: 18$, PMA). Orange Free State: Bothaville (2:18. TMP, hololype of orantensts). Transiaal Buffelspoort Dam (18, AMG), Ellisras (2 $\delta$, AMG), Forest Hill in Johannesburg ( 1 \&, RNiNH), Mogol Nature Reserve. $23^{\circ} 58^{\prime} \mathrm{S}$. $27^{\circ} 45^{\prime} \mathrm{E}(28, \mathrm{NCIP}$ ), Mooketsı (I \& USNM1). 10 km S Nylsirom (18, FSCA), Pafun in Kruger National Park, 22026'S, 31¹2'E (18, CAS; 38, NCIP), Phalaborwa (2 \& FSCA), Rusi de Winter (1 \& AMG), Sabie River Bun-


TANZANIA: Bahan about 25 km N Dar es Salam ( 18, AAM), Tarangri Nahonal Park (2 $8, \mathrm{CAS}$ ).

ZAMBIA 20 km SE Chipata(18, USU), $6-18 \mathrm{~km}$ SW Nfuwe al $13^{\circ} 07^{\prime} \mathrm{S} 31^{\circ}+5^{\prime} \mathrm{E}$ (18, CAS).

ZIMBABWE: Bembesı Rıver (18, USNM1, Bulawayo (18, AMG; I 8. CAS; 1
 Hillside (18, USNN1). Charara 20 km ESE Kariba at $16^{\circ} 33^{\prime} \mathrm{S}, 28^{\circ} 58^{\prime} \mathrm{E}(1 \mathrm{q}, \mathrm{CAS})$, Hwange (18.18, SAM), Kariba al $16^{\circ} 32^{\prime} \mathrm{S}, 28^{\circ} 49^{\prime} \mathrm{E}$ (18, CAS), Khamı Ruins (2 8. CAS, CU), Lupane (18, FSAG), Matetsi in Hwange Districl (28. BMNH, 4 8, 3, $\delta$, SAM), Mount Selinda (I 8, SAM), 11 km NE Nyamandhlovu at $19^{\circ} 48^{\prime} \mathrm{S}$, 28016 E (129, 1 5, CAS, 48 , NHMZ), Sawmılls ( 1 \&, AMG; 18, AMNH, is, NCIP, 18, NHMW: 28,1 s, SAM1 including holotype of dvergens; 18, USNM, 1 \&. 18, ZMA), Umniatı Valley ( 3 \&, SAM), Victona Falls (128. 4 8, CAS; 28 , NHMZ, 2 \&, SAM 1 \%, USNM), no specific localıty (I ס́, IEE)

## Gastrosericus lamellatus Turner

(Figures 15,60-64)
 Pakasa on Zambea River (BMNH), present designation, examined. - Arnold 1922:121 (redescription), 1930:2 (listed); Bohart and Menke, 1976:253 (male head illustraled), 256 (listed).
Gastrosertcus silverlockz Tumer, 1912:422, \&. Leclotype: \&, Zambia: Pakasa on Zambezı River (BNNH), present designation, exammed. New synonym.-Arnold. 1922:123 (ongma! description copted), 1930:2 (iisted); Bohart and Menke, 1976:256 (listed).
Gastrosericus hidentafus Amold. 1922:122. 3. Holotype: 8. Zumbabwe: Sawmills (SAM), exammed. New synonym - Amold, 1930:2 (listed); Bohart and Menke, 1976:256 (hsted).

Diagnosis. - The female of lamellatus has an unusually long mandible, seape, and flagellomere 1 (distance between acetabulum and mandibular apex $5.0 \times$ basal mandibular width, length of flagellomere I 2.8-3.0 $\times$ apical width). In addition, the gaster


Figure 60. Gastrosericus lamellatus: a. female head ( $\times 25$ ); b. dypeus of a female from South Africa ( - 36), c. clypeus of a female from Kenya ( 40 ), d. female mandible, front view ( $\times 30$ ), e, female mandible, outer side ( $\times 27$ ), i, female vertex ( $\times 37$ ).
is all black. Gastrosericus attenuatus is similar, but in lamellatus the free margin of the clypeal lobe is sinuate (Fig. 60a, b), the inner margin has no cleft (Fig. 60d), the pygidial plate is impunctate, and the flagellomere I of most specimens is longer than the least interocular distance (the latter two states are unique within the genus). In attenuatus, the lobe margin is weakly arcuate, the inner margin has a cleft (Fig. 12c), the pygidial plate is sparsely punctate, and flagellomere 1 is shorter than the least interocular distance. The mandible is also unusually long in baobabicus, but in that species the gaster is largely red and the clypeal lobe unusually broad (see Fig. 20a, b).

The male has several unique structures: apex of condylar ridge placed near mandibular midlength; clypeus deeply notched adjacent to median lobe, the notch almost reaching frontoclypeal suture in frontal view (Figs. 61a-f: 62a-f; 63a, b); clypeal free margin with long, narrow process on outer side of notch; clypeal disk with a lamella that is largely reduced in small individuals (the lamella can be easily mistaken for the clypeal disk when the mandibles are closed): pronotal precollar with a pair of concavities, longitudinally carinate on each side; forecoxa with a lamellar process (which is low in small specimens). The barely
setose pygidial plate and largely glabrous sterna II-VI are shared with attenuatus. Like that species, the mandible of many males is irregularly curved (Figs. $61 \mathrm{a}, \mathrm{d} ; 62 \mathrm{a}, \mathrm{d}$ ) and reaches the opposite orbit when closed, a condition not found elsewhere in the genus.

Synonymy.-Turner (1912) considered the syntypes of lamellatus to be females, but his description of the clypeus clearly refers to the male and my study of his specimens confirmed this. Arnold (1922) made the same mistake in his interpretation of the species. Both authors were perhaps misled by the shiny pygidial plate of the male, and neither recognized that lamellatus and silverlocki actually were the male and female of one species. Arnold (1922) did not realize that his new species bidentatus was but a small lamellatus, and that differences between the two were due to allometric growth.
Description. - Mandible elongate, distance between acetabulum and apex $5.0-5.8 \times$ basal width; posterior margin shallowly notched, abductor ridge absent. Labrum: free margin arcuate or truncate. Orbit much closer to hindocellar scar than to antennal socket in female, insignificantly so in male. Propleuron near hindmargin with transverse carina that is obluse in female

 30), d, head of a medrum swe spectmen ( * 28), e, clypeal process, same specimen (* 59), l. dypeus obliquely, same specimen (* 44).
and small males but sharp in large males. Thorax finely sculptured, punctures well-defined on scutum and contiguous, somewhat ill-defined on mesopleuron. Scutal flange evenly curved throughout. Propodeal dorsum microreticulate, with longitudinal carina at least on basal half. Marginal cell: length of costal margin 3.9-6.0 $\times$ apical truncation. Recurrent veins separate or interstitial above.

Setae appressed except semierect between propodeal side and hındface and adjacent to oral fossa (length of latter sctae 0.1$0.3 \times$ basal width of mandible): also many setae on female vertex erect (about one midocellar diameter long). Mesopleural sculpture largely obscured.

Head, thorax and gaster black, except pronotal lobe posteriorly, tegula and humeral plate pale yellow; female mandible
largely brown, yellow basally; male mandible yellow, brown apically. Femora black (pale yellow apically in mosi specimens); tibiae black, pale yellow on dorsum or (foretibia) outer side; tarsi reddish apically, dark brown or (many males) yellow basally. Wings slightly infumate. Forecoxal process yellow apically in many males, and midclypeal process yellow subapically in single male from Mogol Nature Reserve, South Africa (NCIP).
9. - Mandible unusually long (Fig. 60d, e), inner margin with one subbasal tooth but without cleft or preapical tooth (Fig. 60 d ). Clypeus (Fig. 60a-c): disk without teeth or carinae; free margin sinuate, asymmetrical in some individuals from South Africa and Zimbabwe, comer somewhat ill-defined: distance between corners $3.0-5.0 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $0.5 \times$ scar


Figurf 62. (iastrosertius lamellutus, male: a, head of a specimen from henya ( $\times 23$ ), b, cly peal process, same specimen ( $~ 39$ ); c, clypeus obliquely, same specimen $(\times 29)$ : d , head of a small specimen $(\times 31)$, e, clypeal process, same specimen $(\times 62), 1$, clypeus obliquely, same specimen $(=40)$.
length, or about one midocellar diameter (Fig. 60f). Gena simple. Flagellomere I: dorsal length $2.8-3.0 \times$ apical width. Pronotum: precollar not carinate, side not sulcate. Forecoxa simple. Forebasitarsus with 5-7 rake spines; length of apical spine 1.6$1.8 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine $1.5-1.8 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum II with glabrous, median zone that extends from base to apex (glabrous area broad apically). Pygidial plate asetose. Length 6.0-8.7 mm.

ठ. - Mandible: inner margin with obtuse subbasal tooth, Mandible unusually long, apex of condylar ridge located near mandibular midlength; condyle removed from orbit by about one to three midocellar diameters. Clypeus (Figs. 61a-f; 62a-f; 63a, b): free margin deeply notched adjacent to antenna, notch nearly
reaching frontoclypeal suture in front view, with long, narrow process on outer side; median portion acutely angulate and with median projection of clypeal base (projection varying, greatly reduced in smallest individuals, see Variation below for details). Head wide, distance between antennal sockets about 1.9-2.0 $\times$ socket diameter. Distance between hindocellar scar and orbit $1.8-2.0 \times$ scar length. Flagellomere 1: dorsal length 2.2-3.0 $\times$ apical width. Pronotum: precollar obtusely longitudinally carinate on each side, concave between and below the carinae; collar transversely carinate anteriorly, and also with longitudinal carina on each side (longitudinal carinae evanescent in smallest specimen). Forecoxa with flattened process of varying size (Fig. 63 d, e), also with flat, inconspicuous process apically. Foretrochanteral notch longer than distance that separates it from tro-





Figure 64 Gasirosericus lamellatus, male: a. foretrochanter ( $\times 142$ ), b, bottom of foretrochanteral notch ( $\times 356$ ), c , setae of foretrochanteral notch ( $\times 1335$ )
chanteral apex (Fig. 64a), notch bottom with row of erect setae (Fig. 64b, c). Forebasitarsus with 5 rake spines; longest spine $1.4-1.6 \times$ apical width of basitarsus. Inner claws of atl tarsi as large as outer claws. Pygidial plate largely glabrous, with inconspicuous setae. Dorsum of midbasitarsus with two or three preapical spines, dorsum of hindbasitarsus with one or two such spines. Sterna without mesal depressions, lateral punctures of sterna II-VI minute, close to each other laterally and markedly larger and sparse mesally; sternal setae short, sparse. Sternum VIll rounded apically. Volsella: Fig. 63f, g. Length $6.0-8.0 \mathrm{~mm}$.

Variation. - The male of lamellatus varies considerably in the shape of the clypeus, mandibles, and forecoxal process. Details are given below.

In Kenyan males, the clypeal process is roughly rectangular (Figs. 62a-c; 63a, b), its dorsal surface is either evenly convex, with the apical margin narrowly emarginate, or roof-like, with
the apical margin angulate. The latter condition is also found in the single male from Kaokoland, Namibia. In males from South Africa, Zaire, Zambia, and Zimbabwe (Fig. 61), the process narrows anterad. or narrows anterad basally and broadens apically; its free margin is widely emarginate.

In the smallest males (Fig. 62d-f), the mandible is almost evenly curved and does not reach the opposite orbit, the middle clypeal process (in specimens from Kenya, Zimbabwe and South Africa) is reduced to a roughly transverse crest that is interrupted mesally, the lateral process is relatively short, and the forecoxal expansion is markedly shorter than wide. The largest males have an irregularly curved mandible that reaches the opposite orbit when closed (Figs. 61a; 62a), the clypeal middle process in Zimbabwean and South African specimens is markedly elongate (it extends over the clypeal free margin), the lateral process is relatively long, and the forecoxal expansion is markedly longer

 plate (x 52), i. solsella ( $~ 220)$
than wide (Fig. 63d). There is full intergradation between these two extreme forms.

Geographic Distribution (Fig. 15).-Africa south of equator, entering the northern hemisphere in Kenya.

Records. - KENYA. Archer"s Post on Ewaso Ng'iro River (68,2 8, CAS), Kora National Reserve near River Tana (1 \%, BMNH), mouth of Sabakı River, 10 km N Malinds (2 8. ZMK).

MALAWI. Livingstone Falls ( 18, ZMA) 15 km SE Monkey Bay. $14^{\circ} \mathrm{S}, 35^{\circ} 10^{\circ}$ E(1). RMNH).
MOZAMBIQUE Maputo (1\&, AMG), locahty label illegıble (18, USNM).

NAMIBIA: Kaokoland: Ondorusu Falls, SE 1713 Bd $\left[=\right.$ between $17^{\circ} 15^{\circ}$ and $17^{\circ} 30^{\prime}$ S and $13^{\circ} 45^{\circ}$ and $\left.14^{\circ} 00^{\circ} \mathrm{E}\right]$ (! 8, 1 8, SMNW), Ovambe: Ruacana Falls (1 9. SMNW).

SOUTH AFRICA Natal Mkuzı in Zululand (1 8, NCIP), St. Lucia (28, 2 8, ZMA), St Lucta Estuary (28, USNM), St. Mt haels ( 3 ㅇ, AMG). Transval: Afguns ( 4 \&, AMG: 1 \&, CAS), Ellisras ( 5 \& 3 3. AMG: 2 8. RMNH), Mogol Nature Reserve, $23^{\circ} 58^{\prime} \mathrm{S}, 27^{\circ} 45^{\prime} \mathrm{E}(28,1$ \%, NCIP)

## ZAIRE: Kalemié (2 $8, \mathrm{MCZ}, 1$ fo. CU).

ZAMBIA. Pakasa on Zambezı River ( 4 , lectotype and paralectotypes of salverlockl. 68 , lectotype and paralectotypes of lamellatus. BMNH;18,18, USNM), upper Luangwa River ( 1 \&, BMNH, paralectotype of silverlocki). Nyamadzı River ( 3 ? paralectotypes of silverlock. 18 , BMNH)

ZIMBABWE: Umniati Valley (I \&, SAM), Sawmills (1 o, AMG; 1 9, BMNH;
 NHMW; 4 ঠ, SAM, including holotype of bdentatus; 1 ठ, UCD; $1 \delta$, USNM; 1 ¢, 1 む, ZMA; 1 \&, ZMHU).

## Gastrosericus lepidus sp. n.

(Figures 59, 65, 66)
Derivation of Name. - Lepidus is a Latin masculine adjective meaning pleasant, agreeable, neat, witty.

Diagnosis.-Gastrosericus lepidus is a West African species. The female has a distinctive clypeus (Fig. 65a, b) which is all yellow and whose disk has a glabrous, transverse or Y-shaped, impunctate swelling; the lobe free margin is not angulate laterally, subdivided into three arcuate portions, of which the median is the largest. In addition, the gaster is all red and the forecoxal venter is basically flat, not swollen anterolaterally.

The male is characterized by: setae appressed on head; clypeus yellow, with acutely pointed lobe; scutal flange evenly curved throughout; and terga without yellow markings. Males of herero, pratensis, and some unicolor are similar, but in lepidus the clypeus is uniformly yellow (partly black in pratensis), the femora have yellow, apical spots (no such spots in pratensis), the gaster is black (red basally in herero), and the inner and outer claws of each pair are equal in size (inner claws smaller in unicolor).

Description. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin conspicuously emarginate. Orbit equidistant from hindocellar scar and antennal socket or nearly so in female, minimally closer to antennal socket in male. Propleuron near hindmargin with obtusely conical, setose tubercle. Thorax finely punctate, but individual punctures discernible on scutum. Scutal flange evenly curved throughout. Marginal cell: length of costal margin $4.0-4.8 \times$ apical truncation. Recurrent veins separate or interstitial above.

Setae appressed on head and thorax including those adjacent to oral fossa, nearly appressed between propodeal side and hindface; obscuring mesopleural integument.

Head black, but clypeus, mandible (except dark brown apex), and scapal venter pale yellow. Thorax black, but pronotal lobe, tegula, and humeral plate yellow. Gaster red in female, largely black in male (apical depressions of segments translucent). Femora red (female) or black (male), yellow apically (yellow spot longer ventrally than dorsally, nearly reaching femoral base on forefemoral venter). Tibiae largely yellow, but reddish ventrally (foretibia reddish on inner side). Tarsi yellow or reddish. Wings hyaline.
9.-Mandible (Fig. 65c): inner margin with subbasal tooth, but without preapical tooth; cleft almost rectangular. Clypeus (Fig. 65a, b): disk without teeth or carinae, but with transverse or-Y-shaped, glabrous, impunctate swelling; free margin of lobe not angulate laterally (corner ill-defined, round), subdivided into three arcuate portions (median portion larger than lateral ones). Distance between hindocellar scar and orbit about $1.3 \times$ scar length. Gena with small tooth behind mandibular base next to occipital carina (Fig. 65d). Flagellomere I: dorsal length $1.8 \times$ apical width. Pronotum: precollar carinate laterally, side deeply sulcate. Forecoxa flattened, not raised anterolaterally. Forebasitarsus with 5 or 6 rake spines; length of apical spine $1.4 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine about $0.4 \times$ apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II pubescent


Figure 66. Gastrosericus lepidus: male foretrochanter ( $\times 208$ )
throughout. Pygidial plate with stout. sparse setae (Fig. 65e) except setae dense apically. Length $8.5-11.6 \mathrm{~mm}$.
o.- Mandible: inner margin without subbasal tooth. Clypeus: lobe sharply pointed, free margin not angulate laterally, forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about $1.5 \times$ scar length. Flagellomere I: dorsal length $1.1 \times$ apical width. Foretrochanteral notch about as long as distance that separates it from trochanteral apex (Fig. 66), its bottom uniformly covered with appressed setae. Forebasitarsus with 3 or 4 rake spines; longest spine about $1.0 \times$ apical width of basitarsus. Dorsum of mid- and hindbasitarsus without preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna without mesal depressions, closely, minutely punctate throughout; sternal setae short, uniform. Sternum VIll rounded, truncate, or minimally concave apically. Volsella: Fig. 65f. Length 5.37.6 mm .

Geographic Distribution (Fig. 59).-Senegal, Mali.
Records. - Holotype: 9, SENEGAL: Ndangane 45 air km SE Mbour, 10 Jul 1991, WJP (CAS). Paratypes: MALI: Ouatagouna, $15^{\circ} 11^{\prime} \mathrm{N}, 0^{\circ} 43^{\prime} \mathrm{E}, \mathrm{Jul} 1978$ and 17 Jul 1978, G Popov ( 18, CAS; 4 \&, 1 §, KMG).

SENEGAL. Diourbel, 21 Jul 1991 , AM (1 f, AAM); 40 km ESE Louga, 21 Jul 1991, AM (2 8,1 \%, AAM), WJP (1 §, CAS): Ndangane 45 aır km SE Mbour, 10 Jul 1991 , WJP ( 5 8. CAS); same data but 26 Jul ( 18 . CAS): same localsty, 11 Jul 1991, AM (2 8, AAM); 3 km NW Samba Dıa ( $=70$ aır km W Kalack), 17 Jul 1991. AM (2 ס, AAM), 9 Jul 1991, WJP (1 9, 17 \&, CAS)

Gastrosericus lucidus sp. n.
(Figures 67, 68)
Derivation of Name. - Lucidus, Latin masculine adjective meaning full of light, bright, shiny.

Diagnosis. - The female of lucidus has yellow preapical fasciae on terga I-V and a yellow pygidial plate, and the clypeal lobe is broad, evenly arcuate, with a nonprominent corner (Fig. $67 \mathrm{a}, \mathrm{b})$. Gastrosericus hombori is similar, but unlike that species the propodeal side of lucidus is sulcate, most setae of the pygidial plate are inconspicuous, and apical tarsomeres have no ventral spines.

The male has a distinctive clypeus: the lobe free margin is

 foretrochanter $(\times 234)$. g. volsella ( 72 )
essentially roundly arcuate (or obtusely pointed), but with an additional, obtuse projection apically that, however, is poorly defined in some specimens (Fig. 67 d , e). Subsidiary recognition features are: clypeus yellow and terga with palc yellow, preapical fasciae.

Description. - Mandible with notched posterior margin, abductor ridge absent. Labrum conspicuously emarginate. Orbit cquidistant from antennal socket and hindocellus in female, instgnificantly closer to antennal socket than to hindocellus in male. Propleuron simple. Thorax finely sculptured, scutum and
mesopleuron with ill-defined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.6$4.3 \times$ apical truncation. Recurrent veins separate or interstitial above.

Setae appressed (including those adjacent to oral fossa and between propodeal side and hindface); obscuring mesopleural integument.

Head and thorax black, but the following are pale yellow: mandible (except brown apically), clypeus, scapal venter, pronotal lobe, tegula, and humeral plate. Integumental coloring of

gaster red, but terga with pale yellow, preapical fascia; fasciae emarginate laterally on terga 1 and $1 I$ in female and II-VI in male, with red, lateral spot on terga 1II-V in female; pygidial plate yellow in female. Femora red, pale yellow apically (yellow spot nearly reaching base on forefemur; red partly replaced by black in some males). Tibiae yellow, reddish brown ventrally. Tarsi yellow, apical tarsomeres of mid- and hindtarsi reddish in female. Wings hyaline.
9.- Mandible (Fig. 67c): inner margin with basal tooth and obtuse cleft, without preapical tooth. Clypeus (Fig. 67a, b): disk without teeth or carinae; free margin of lobe arcuate; distance between corners $2.4 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $1.5 \times$ scar length.

Gena simple. Flagellomere I: dorsal length $1.5-1.6 \times$ apical width. Pronotum: precollar carinate laterally, side sulcate. Forecoxa shallowly concave, anterior margin carinate. Forebasitarsus with 5 rake spines; length of apical spine $1.4 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine about $0.4 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum II apicomesally with glabrous, triangular area. Most setae of pygidial plate inconspicuous, but several apical setae stout. Length $5.9-7.8 \mathrm{~mm}$.
\$. - Mandible: inner margin obtusely angulate near base. Clypeus (Fig. 67d, e): free margin of lobe markedly arcuate (or obtusely pointed) and with an additional, small projection mesally (which is poorly delined in some specimens), not an-


 dypeus ( $\times 71$, 1, volsella ( $~ 230)$


Figure 70. Gastrosericus madecussus: a, female head and part of thoran in dorsal view showing propleural processes. uncoated specimen ( 30 ; b. mate foretrochanter ( $\times 221$ ), c, bottom of foretrochanteral notch ( $\times 592$ ).
gulate laterally (forming single curved line with rest of clypeal margin). Distance between hindocellar scar and orbit about 1.5 $\times$ scar length. Flagellomere I: dorsal length $0.85-1.1 \times$ apical width. Foretrochanteral notch longer than distance that separates it from trochanteral apex; notch bottom glabrous, setac on its inner margin erect (Fig. 67f). Forebasitarsus with 2 or 3 rake spines which are shorter than apical width of basitarsus. Dorsum of mid- and hindbasitarsus with no preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna without mesal depressions, minutely closely punctate throughout, shortly, evenly pubescent. Sternum VIII truncate or very shallowly concave apically. Volsella: Fig. 67g. Length 4.6-5.6 mm.

Geographic Distribution (Fig. 68).-Senegal to Burkina Faso.

Records. - Holotype: §, SENEGAL: Ferlo, Felé-olé, Jul 1976, GC (UCD). Paratypes: BURKINA FASO: Gourma Kompienga 20 km S Pama, 1-16 Jun 1988. Sanborne, Landry, and Tou ( 3 \%, 1 ह, CAS; $5 \% 1$ \%, LEM).

SENEGAL: same data as holotype ( 5 dै, UCD): same data except 26 Jul ( 1 of, UCD); same data except day not indicated ( 78, CAS, 6 fo UCD); same data but 6 and 19 Oct ( 4 8, UCD); 70 km E Kolda, 14 Jul 1991, AM (1 9, CAS).

## Gastrosericus madecassus (Kohl)

(Figures 69-71)
Eparmatostcthus madecassus Kohl. 1907:169.9. Holotype: 8. Madagascar: Taolanaro (ZIN). examined.-Pate, 1937:26 (misspelled as Eparmostethus),-In Gastrosencus: Amold, 1927:116 (Eparmatostethus synonymized with Gastrosericus), $1945: 92$ (8): Leclercq. 1960:96 (Madagascar: Behara), Bohart and Menke 1976:256 (11sled): Leclercq, 1990:115 (Madagascar: Bekily).

Diagnosis. - Gastrosericus madecassus and zoyphon are the only two species of the genus that occur in Madagascar. The female of madecassus has a unique clypeus: the clypeal lobe has a small but sharply delimited bevel, and the lobe corner is more prominent than median part (Fig. 69a-c). Like zorphion and unlike other species, the mandibular posterior margin is arcuate basally (Fig. 69e). The propleuron expanded into a large, winglike projection (Figs. 69g; 70a) is shared only with swalei and zoyphion (a similar but much smaller process is found in synander and occasional funereus).

The male of madecassus is very similar to that of zoyphion Both have setae on sterna III-VI that are markedly longer than on sternum II but no longer than the midocellar diameter and


not concealing the integument. In most other species, the setac of sternum Il and the following ones are of equal length, markedly shorter than the midocellar diameter: in several other species. e.g. moricei or waltlii, these setae are markedly longer than the midocellar diameter and conceal the integument. The sternal setae are similar in swalei and symander, but unlike these species the clypeus of madecassus and zoyphion is partly yellow (rather than black) and the gaster is red at least basally (rather than all black). Also, punctures of sterna 1II-VI in madecassus and zoyphon are larger than on sternum II, a condition unique within the genus, although difficult to see in the smallest specimens. The two species can be distinguished only with difficulty: in
madecassus, the clypeal free margin is obtusely tridentate (Fig. $69 \mathrm{~h}, \mathrm{i}$ ), whereas somewhat irregularly rounded in zoyphion (Fig. 15le).

Description.-Mandible: posterior margin stepped in female, notched in male, abductor ridge absent. Labrum: free margin broadly, shallowly emarginate. Orbit closer to hindocellar scar than to antennal socket (only slightly so in male). Propleuron not raised near hindmargin but with minute, conical tubercle. Thoracic sculpture fine, scutal punctures inconspicuous. Scutal flange evenly curved except more concave near hindcomer. Marginal cell: length of costal margin $4.0-4.75 \times$ apical truncation. Recurrent veins confluent in a petiole anteriorly.


Figure 72. Gastrosericus margmahs: a, female clypeus ( $\times 92$ ): b, female mandible. froni view ( $\times 92$ ); c, Female mandible, outer side ( $\times 92$ ): d , female marginal cell ( $\times 127$ ); e, male clypeus ( $\times 133$ ), f, volsella ( $\times 335$ )

Vestiture short, appressed (also adjacent to oral fossa and on propodeum), obscuring mesopleural integument.

Thorax black, pronotal lobe pale yellow. Femora black, except pale yellow apically (narrowly so in female). Wings almost hyaline.
9.- Mandible: inner margin without subbasal or preapical teeth, with broad, shallow concavity probably derived from cleft (Fig. 69d); condylar ridge roundly arcuate near base, obtusely angulate apically (Fig. 69e). Clypeus (Fig. 69a-c): disk without teeth or carinae but with short, shallowly concave bevel that is unsculptured, sharply delimited, and almost perpendicular to remaining surface; lobe corners more prominent than middle section, distance between corners more than $4.0 \times$ distance between corner and orbit; free margin of lobe concave laterally. Head wide, distance between antennal sockets about $2.0 \times$ socket diameter. Distance between hindocellar scar and orbit about $0.9 \times$ scar length. Gena with prominent tubercle adjacent to mandibular base (Fig. 69f). Flagellomere I: dorsal length $2.0-$
$2.25 \times$ apical width. Pronotum: precollar with lateral, longitudinal carina; side deeply sulcate; collar angulate laterally. Propleuron with long, large apicolateral projection (Figs. 69g; 70a). Forecoxa shallowly concave anteriorly, foremargin carinate both inside and outside of concavity, outer carina expanded into triangular tooth. Forebasitarsus with 4 or 5 rake spines; length of apical spine 1.1-1.2 $\times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine about $0.4 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum II apicomesally with glabrous, triangular (but not depressed) area. Most setae of pygidial plate inconspicuous, but two or three apical setae stout. Length $5.5-7.0 \mathrm{~mm}$.

Head black, but mandible (except apically) and clypeus anteriorly yellowish red (yellowish band on clypeus interrupted adjacent to lobe in some specimens). Gaster red. Tibiae yellowish brown, darkened ventrally. Tarsi ferruginous.
o. - Mandible: inner margin without subbasal tooth. Clypeus (Fig. $69 \mathrm{~h}, \mathrm{i}$ ): lobe obtusely tridentate, median tooth more prom-


Figure 73. Gastrosericus margmalis: male foremochanter $(x+19)$
inent than lateral corners; comers as far from each other as from orbit. Distance between hindocellar scar and orbit 0.9-1.0 $\times$ scar length. Flagellomere I: dorsal length 1.3-1.4 $\times$ apical width. Foretrochanteral notch shallow, slightly shorter than distance that separates it from trochanteral apex (Fig. 70b), margined anteriorly by row of erect setae (Fig. 70c). Forebasitarsus with 2-4 rake spines (longest spine about equal to basitarsus width). but spines absent in the only male from Behara. Mid- and hindbasitarsus without preapical spines dorsally or laterally. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna not depressed mesally; sterna III-VI: punctures larger and setae longer than those of sternum II (setae not concealing integument). Sternum VIII emarginate apically. Volsella: Fig. 69j. Length $4.0-6.0 \mathrm{~mm}$.

Head black, but the following are pale yellow: clypeus (except basally), mandible (except apically), and scapal venter. Gaster all red in some specimens, but mostly segments I and II, or IIII. red and remainder dark brown. Tibiae pale yellow except ventrally and laterally; the ventral and lateral area (that does not extend to base nor apex) is ferruginous on foretibia, ferruginous or black on midtibia, and black on hindtibia. Foretarsus ferruginous, mid- and hindtibia brown (except pale yellow basitarsi).

Life History. - This species collects both young grasshoppers and homopterans, as suggested by two females in MNHN, each with one associated prey. The homopteran, regarded as a cercopid by Arnold (1945), actually is a flatid according to N. D. Penny.

Geographic Distribution (Fig. 71), - Southern and western Madagascar

Records - MADAGASCAR. Fianarantsoa Isalo National Park at $22^{\circ} 40^{\prime} \mathrm{S}$. $45^{\circ} 10^{\prime} \mathrm{E}\left(38,48\right.$. CAS) and Piscine Naturelle, al $22^{\circ} 34^{\prime} \mathrm{S}, 45^{\circ} 22^{\prime} \mathrm{E}$ (28. AAM). Ranohura (1 \& CAS). Mahajanga Amborovy 8 km NE Mahajanga ( 198,11 f, CAS; 1 Q, 1 \&, USNM), Mahajanga ( 1 Q. BMNH). Toliara 22 km E Ampanıhy ( 1 Q, AAM), Behara (19, FSAG. 1 \&, 1 \%, MRAC), Beklly (18.18, BMNH, 12q.6 §. MNHN), Berenty Reserve ( 1 \&. BMNH. 5 \&. CAS). Belıky (1 8, BMNH), Beza Mahafaly Reserve. $23^{\circ} 44^{\prime} \mathrm{S} .44^{\circ} 42^{\prime} \mathrm{E}\left(69.2\right.$ क, CAS; 138.2 古, KU). Ifaty at $23^{\circ} 08^{\prime} \mathrm{S}$, 43037 E ( 1 f. AAM), Manombo ( 1 \&. BMNH), Taolanaro ( 18, CAS, $18, Z I N$, holotype of madecassus), 5 km N Tohara ( $59.7 \mathrm{f}, \mathrm{CAS}$ ), 10 km NE Tohara ( 3 AAM. 89.28. CAS), 12 km SE Tohara (18. AAM).

## Gastrosericus marginalis Gussakovskij

(Figures 72, 73, 79)
Gastrosericus marginalis Gussakovskı, 1931:456, 8, f. Lectolype: of, Turkmenastan: Krasnovodsk (ZIN), present designation. examaned. - Pulawski, 1964: 112; Bohart and Menke, 1976:256 (listed). 260 (allustration of male mandible); Kazenas, 1978:137 (in key).

Diagnosis. - Unlike all other Gastrosericus except mongolicus, marginalis has an unusually short marginal cell, with costal margin shorter than the apical truncation (Fig. 72d), a nonemarginate posterior mandibular margin, and in the female the free clypeal margin is arcuate orbit to orbit (not concave laterally). The yellow gastral markings constitute a subsidiary recognition feature. Gastroscricus mongolicus is similar according to Gussakovskij (1931), but the only known specimen of that species (a male) has been lost. The male flagellomeres I and following are scarcely longer than wide in marginalis, and markedly longer than wide in mongolicus according to Gussakovskij.

Description. - Ventral margin of malar space less concave between mandibular acetabulum and abductor swelling than in other species. Mandible: posterior margin entire, shallowly concave (Fig. 72c), abductor ridge absent. Labrum: free margin broadly, shallowly emarginate. Orbit insignificantly closer to hindocellar scar than to antennal socket in female, insignificantly closer to antennal socket than to hindocellar scar in male. Propleuron simple. Thorax microsculptured, without well-defined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin about $0.8-0.9 \times$ apical truncation (Fig. 72d). Recurrent veins separate.

Vestiture appressed, including setae adjacent to oral fossa as well as between propodeal side and hindface; largely concealing mesopleural integument, conspicuous on all terga and sterna IIV.

Head black, but mandible (except apically), clypeus, scape and pedicel pale yellow; flagellum light brown ventrally, brown dorsally. Thorax black, with pale yellow pronotal lobe, tegula, and humeral plate. Gaster ferruginous. terga I-V (I-VI in male) with pale yellow, apical fasciae (fasciae broadened laterally). Fore- and midfemur light brown, pale yellow at least apically (all dorsum yellow in some specimens); hindfemur varying from all brown to mainly yellow but brown ventrally. Tibiae and tarsi pale yellow. Wings hyaline.
8.- Mandible (Fig. 72b): inner margin with no subbasal and preapical teeth or cleft. Labrum: free margin broadly, shallowly emarginate. Clypeus (Fig. 72a): disk without teeth or carinae; lobe not differentiated, free margin arcuate orbit to orbit. Distance between hindocellar scar and orbit about $1.2 \times$ scar length. Gena simple. Flagellomere I: dorsal length $1.2-1.3 \times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 or 6 rake spines; length of apical spine 2.0-2.5 $\times$ basitarsus width. Foretarsomere IV: length of inner apical spine about $1.3 \times$ apical width of tarsomere. Tarsomere $V$ with a few. inconspicuous spines basoventrally. Sterna pubescent throughout, setae largely concealing integument on sterna II-IV. Pygidial plate covered with fine, appressed setae that totally obscure integument. Length $4.5-5.6 \mathrm{~mm}$.
8. - Mandible: inner margin without subbasal tooth. Clypeus (Fig. 72e): free margin of lobe rounded, not angulate laterally, forming single curved line with rest of clypeal margin. Distance

 modlarsomeres 1 and 11 ( $\cdot 6$ ).
between hindocellar scar and orbit about 1,2-1.3 $\times$ scar length. Flagellomere 1: dorsal length 1.1-1.3 $\times$ apical width. Foretrochanter not notched (Fig. 73). Forebasitarsus with 2 or 3 rake spines; longest spine 2.0-2.5 $\times$ apical width of basitarsus. Dorsum of midbasitarsus with no to two preapical spines, dorsum of hindbasitarsus with no or one such spine. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna II-IV with conspicuous, subapressed. straight setae that are markedly longer than tergal setae but not entirely conceal integument; sternal surface minutely, uniformly punctate. Sternum VIII emarginate apically. Volsella: Fig. 72f. Length $3.5-5.0 \mathrm{~mm}$.

Geographic Distribution (Fig. 79).-Egypt (including Sinai) and Transcaspia.

Records.-COMMONWEALTH OF INDEPENDENT STATES: Tajikistan. 15 km SW Dushtı, which is $37^{\circ} 20^{\prime} \mathrm{N}, 68^{\circ} 40^{\prime} \mathrm{E}(18, \mathrm{ZlN})$. Turhmenistan: Askhabad ( 1 ह., CAS), Krasnovodsk ( $1 \mathrm{\delta}, \mathrm{ZIN}$, lectolype of marginahs). Uzbekistan: Khiva (18, 1\%, ZIN. paralectotypes of margmahs).

EGYPT: Al Fayyum: Karans ( 5 \&, 5 ó, CAS), Kom Oshem on Caro-Fayum road (2 8, CAS, 1 \&, 1 o, CGR; 1 o, USNMt). Al Jizah (= Ghıza): Abu Rawash (1 \& ex coll. Alfieri, USNM), Ghiza Pyramids (2q, CAS, NHMW). Al Qahirah (= Carro): Wadi Digla (2 8, AAM, CAS), Wadi el Tih (18, 1 , NHMW). Qena: 85 km ENE Qena on road to Safaga (28,2 8, CAS). Sina ( $=$ Sina1): Wadı Gharandal 30 km NW Abu Zenıma (19. CAS).

## Gastrosericus mirabilis sp. n.

(Figures 68, 74)
Derivation of Name. - Mirabilis is a Latin adjective meaning wonderful, which well suits this pretty species. Also an al-
lusion to Welwitschia mirabilis, an unusual gymnosperm that occurs, like the wasp, in the Namib desert.

Diagnosis. - The female of mirabilis has several unique characters: the clypeal lobe is truncate (Fig. 74), with prominent corners and shallowly concave free margin (the clypeal lobe is also truncate in temporalis and truncatus, but its overall shape is different and unlike mirabilis the gena is tuberculate); the head surface is sloping posterad immediately behind the hindocelli; the pygidial plate is ill-defined; and the mid- and hindtarsomeres have numerous dorsal setae (Fig. 74e) whose length is about twice the tarsomere diameter (two to four spines present in other Gastrosericus, their length being $1.0-1.5 \times$ the tarsomere diameter).

Description (based on holotype only). - Mandible: posterior margin notched, notch unusually long (Fig. 74d), abductor ridge absent. Labrum: free margin acutely angulate. Orbit equidistant from antennal socket and hindocellar scar. Propleuron simple. Thorax finely sculptured, scutal punctures ill-defined. Scutal flange evenly curved throughout. Marginal cell: length of costal margin $2.6 \times$ apical truncation. Recurrent veins separate.

Vestiture mainly appressed, but a few setae erect adjacent to oral fossa (setal length about $0.2 \times$ mandibular basal width); setae erect, shorter than midocellar diameter on scape and vertex; not entirely appressed between propodeal side and hindface; totally obscuring mesopleural integument; sparse, very short on mesothoracic venter.
Head black. but the following are yellow: clypeus, mandible (except apically), and antenna (except scape basodorsally and
basolaterally). Thorax black, pronotal lobe, tegula and humeral plate yellow. Gaster red, tergum VI yellow. Fore- and midfemur black basally, yellow on apical half (black area longer dorsally than ventrally); hindfemur reddish dorsally and apically, black ventrally (black area extending to about two-thirds of femoral length). Tibiae yellow (mid- and hindtıbrae reddish ventrally). Tarsi yellow. Wings hyaline.
8.- Mandible (Fig. 74c): inner margin without subbasal or preapical teeth or cleft. Clypeus (Fig. 74a, b): disk flat, without leeth or carinae; lobe expanded mesally into mesal projection (whose free margin is slightly concave); frec margin concave between projection and corner, which is ill-defined; distance between corners about $2.5 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $1.5 \times$ scar length. Gena simple. Flagellomere 1: dorsal length equal to apical width. Head surface sloping posterad immediately behind hindocellar scars. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 rake spines: length of apical spine $2.2 \times$ apical width of basitarsus. Dorsum of mid- and hindbasitarsi with numerous setae, setal length about twice basitarsal diameter (Fig. 74e). Foretarsomere IV: length of inner apical spine $1.2 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum II largely glabrous. Pygidial plate ill-defined (lateral carina evanescent), most of its setae thin but apical setae stout. Length 6.2 mm .

ठ. - Unknown.
Geographic Distribution (Fig. 68).-Namibia.
Records.-Holotype: : NAMIBIA Swakopmund Dintrict 9 km S Gobabeb. 12 Feb 1978. dunes. O. Lomholdt (ZMK)

## Gastrosericus modestus Arnold

(Figures 68. 75. 76)
Gastrosericus modestus Arnold. 1922:126. \&. Holotype. '. Zimbabwe: Sawmills (SAM), exammed - Arnold, 1930:2 (11sted). 1940:122 (description of 8), Bohan and Menke. 1976:256 (listed).

Diagnosis.-Like many other species, modestus is small (length $4.5-5.8 \mathrm{~mm}$ ) and has an almost completely appressed vestiture. The female has a distinctive elypeus whose lobe is subdivided into a relatively narrow median projection and a small, lateral, angulate expansion on each side (Fig. 75a, b); the distance between projection corners is about $0.7 \times$ distance between corner and orbit. Subsidiary recognition features are: inner margin sımple, without cleft or teeth (Fig. 75c), gena not dentate, oculo-ocellar distance large (distance between hindocellar scar and orbit 1.9-2.0 $\times$ scar length).

The male has an all black, acutely pointed clypeus (Fig. 75d. e) and the setae are appressed on the vertex and between the mandibular base and occipital carina. Other species are similar (bambara, fluriatilis, pulchellus, truncatus, and uncolor), but modestus is unique in having, on sterna $\mathrm{II}-\mathrm{VI}$, conspicuous rows of erect, sparse setae that emerge from the apical depression's base (Fig. 75f). These setae are inconspicuous or absent in the other species. The head shape of both sexes (Fig. 75a, d) is also a good recognition feature, although difficult to describe or to quantify: the frons is wide, the inner orbits almost parallel, and the vertex basically flat.

DESCRIPTION.-Mandible: posterior margin notched, abducfor ridge absent. Labrum: free margin acutely emarginate. Orbit
closer to antennal socket than to hindocellar scar. Propleuron simple. Thorax finely sculptured, scuium with minute, barely distinguishable punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.5-5.0 $\times$ apical iruncation. Recurrent veins confluent above in a petiole.

Setae appressed on head and thorax except inclined between propodeal side and hindface; almost completely obscuring mesopleural integument.

Head black. mandible yellow except reddish apically; scapal venter all brown or yellowish basally and apically; female clypeus reddish apicomesally. Thorax black except pronotal lobe, tegula anteriorly, and humeral plate yellow: pronotal dorsum red in females from Mooketsi. Tibiae red except yellow on dorsum or (foretibia) on outer face. Wings almost hyaline, front wing slightly infumate beyond cells.
s. - Mandible (Fig. 75c): inner margin without cleft and subbasal or preapical teeth. Clypeus (Fig. 75a, b): disk without teeth or carinae; lobe with median projection (whose free margin is obtusely pointed), free margin concave between projection and corner, which is well-defined; distance between corners $1.2 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit 1.9-2.0 $\times$ scar length. Gena simple. Flagellomere 1: dorsal length $1.2 \times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 rake spines; length of apical spine 1.3-1.5 $\times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine about $0.5 \times$ apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II uniformly pubescent throughout. Setae of pygidial plate inconspicuous except a feu apical setae somewhat thickened. Length $4.5-5.8 \mathrm{~mm}$,

Gastral segment 1, or segments I and 11, or II and III, or 11VI, largely reddish; remander black (apical depressions translucent). Femora red brown, darker basally and lighter apically. Tarsi red.

ס. - Mandible: inner margin withour subbasal tooth. Clypeus (Fig. 75d, e): lobe acutely pointed mesally, not angulate laterally. its free margin Corming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 2.2 $\times$ scar length. Flagellomere I: dorsal length $1.1 \times$ apical width. Foretrochanteral notch longer than distance that separates it from trochanteral apex (Fig. 76). Forebasitarsus with 2 rake spines: longer spine about equal to apical width of basitarsus. Midbasitarsus with one preapical spine on dorsum, hindbasitarsus without such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely setose. Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform; sterna 11-V1, at the base of apical depression, with a row of conspicuous, erect, sparse setae. Sternum VIII rounded apically. Volsella: Fig. 75 g . Length 4.5 mm .

Tergum I red, remaining terga black with translucent apical depressions, tergum II with red preapical zone. Femora dark brown basally, brown red apically (forefemur yellowish apically). Foretarsus yellow, midtarsus yellow basally and red apically, hindtarsus red.

Geographic Distribution (Fig. 68). - South Alrica to Namibia and Zimbabwe.

Records. - NAMIBIA Grootfontein 30 km NE Grootfonten (2. CAS). 80 km NE Grootfonten ( 1 \&, MS). Kasango Gebied Rundu (I \&, CAS).

SOUTH AFRICA. Transvaal: Mooketsi (28. USNM). Pretona (18. CU)
ZIMBABWE: Khamı(1: SAM), Sammills (28, SAM1, holotype and paratype).

 clypeus ( a 94). f. male gaster laterally ( $\times 33$ ), g. volsella ( $\times 354$ ).

## Gastrosericus mongolicus Gussakovskij

(Figure 77)
Gastrosertcus mongoltcus Gussakovskıj. 1931:457:, ©. Holotype: ©, China: Inner Mongolian Autonomous Region: Hara Hoto, now Hei-Ch'eng (ZIN, now lost), not examıned.-Bohart and Menke, 1976:256 (listed); Kazenas, 1978:137.

## Diagnosis. - See marginalis.

Description. - The holotype and the only known specimen of mongolicus is apparently lost, as I was not able to find it during my many visits to the Zoological Institute, St. Petersburg,
in the 1960s and 1970s. According to the original description, mongolicus shares all basic structures with marginalis (including the nonemarginate mandible, short marginal cell, and yellow gastral markings) but differs from the latter in having a longer antenna. Length 4.5 mm .

Geographic Distribution (Fig. 77). - Known only from Inner Mongolia Autonomous Region of China.

[^5] Hoto), $41^{\circ} 45^{\prime} \mathrm{N}, 101^{\circ} 24^{\prime} \mathrm{E}$ (Gussakovskij, 1931).


Figure 76. (iustrosericus modestus, male: a, forctrochanter ( $\times 269$ ), b, bottom of foretrochanteral notch ( $\times$ about 553 ).

## Gastrosericus moricei E. Saunders

(Figures 77~79)
Gastrosericus moriceı E. Saunders, 1910:529, z. Hololype: है, Algena: Biskra (OX゙FORD, F. D. Morice coll.), examined by de Beaumoni, 1960b:246. - Monce, 1911:106 (Algena), von Schulthess, 1926:215 (Lıbya), Gugha, 1934301 (Lıbya); Honore, 1942:53 (Egypt); not Giner Mari, 1945:376 (actually Gastroserucus drewsent); de Beaumont, 1955:192 (description of 8), 1960b:246 (study of holotype), Pulawskı, 1964:112 (Egypi); de Beaumonı, Bytınskı-Salz, and Pulawskı. 1973:16 (Israel), Bohart and Menke, 1976:256 (listed). Pulawski, 1982:364 (synonymy); Krombeın and Pulawski, 1986:11 (redescripuon).
Gastrosericus timbriatus Kazenas, 1980:I104, ס, ㅇ. Holotype: ठ. Tajıkıstan: Kolkhozabad District: 7 km E Garauty near Y゙angıabad (ZIN), paralypes examıned. Synonymized with Gastrosencus moncet by Pulawski, 1982:363.

Diagnosis. - The females of moricei and sanctus have the entire pygidial plate covered with dense, stout setae; appressed genal and propodeal pubescence; and the apical tarsomeres with one or more basoventral spines (spine lacking in some sanctus). Females of hombori, marginalis, and mongolicus are similar, but they have yellow apical bands on terga I-V that are lacking in moricei and sanctus. In addition, the pygidial setae of hombori are sparse, not concealing the integument (dense, concealing integument in moricei and sanctus), and the marginal cell of marginalis and mongolicus is unusually short (Fig. 72d). The females of moricei and sanctus can be distinguished only with difficulty by details of the clypeus and tarsomere spine structures, none of which is well-defined. First, the free margin of the clypeal lobe is essentially arcuate in moricei (Fig. 78a, b), and somewhat sinuate in most sanctus (Figs. 102a, b; 103a, b). a difference analogous to that in males, although less prominent. Second, the lobe free margin and the lip are simple in moricel while in sanctus the margin is minutely projecting next to each corner (Figs. 102a, b; 103a, b) and the lip has a lateral tubercle in some specimens (Fig. 102b). Third, the apical tarsomeres of moricei have one (occasional specimens) to four ventral basomedian spines (Fig. 79a, b), not counting the spines on lateral margins; in sanctus, there is one or occasionally no or two such spines.

The males of moricei and sanctus have appressed genal and propodeal pubescence, and the setae of sterna III and IV are
conspicuously long (Fig. 79e. f); the apical setae extend slightly beyond the sternal hindmargins. The male of marginalis is similar but has yellow tergal fasciae that are lacking in the other two species, the marginal cell is unusually short (Fig. 72d), and the posterior mandibular margin is not notched. The males of moricei and sanctus are easily recognized: in moricei, the clypeal lobe is obtusely pointed (Fig. $78 \mathrm{f}-\mathrm{h}$ ) and in most specimens sterna 111 and $1 V$ are fimbriate side to side, not depressed mesally (Fig. 79e, f); only in some specimens from Oman fimbriae do not cover the lateral sternal area: in sanctus the clypeal lobe is broad, with an arcuate or sinuate free margin and well-defined corners (Fig. 102d), and sterna III and IV are shallowly depressed under fimbriae. which are absent laterally.

Description. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin broadly emarginate. Orbit closer to hindocellar scar than to antennal socket (slightly so in male). Propleuron in most specimens with small, obtuse tubercle near hindmargin (tubercle setose like remaining propleuron). Thorax microsculptured. without well-defined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin $1.8-2.2 \times$ apical truncation. Recurrent veins separate or interstitial above.

Vestiture appressed, including setae adjacent to oral fossa, almost totally obscuring mesopleural integument; in some specimens not totally appressed between propodeal side and hindface.

Head and thorax black (thorax red except darkened dorsally in single female from Chenab River bank, Pakistan), and the following are pale yellow: mandible (except apex), clypeus (black laterally in some Sri Lankan females), scapal venter, pronotal lobe (only posteriorly in some Sri Lankan specimens), humeral plate, and tegula. Gaster mainly ferruginous, but segments IVVIl brown in Somalian males; gaster basally brown with segments reddish apically and laterally in specimens from Salalah Island, Oman; terga black with reddish apical depressions in Thai specimens. Color of leg varying (see Geographic Variation below).
9. - Mandible variable (Fig. 78c-e): inner margin with cleft

Figure 77. Collecting localities of Gastrosericius marginalts. mongolicus, and moricel. The combined symbols mdicate that two species occur in one locality


Figure 78. (fastrosericus moricer a, female head ( $\times 34$ ), b, female clypeus $(\times 70$ ), c , mandible of a female from Tunsia ( $\times 76$ ); d, mandible of a female from Egspi ( $~ 74$ ), e mandible of a female from $\operatorname{Sri} \operatorname{Lanka}(\times 61)$, f, male head frontally $(\times 41)$ : g , male clypeus ( $\times 65$ ); $h$, outline of male clypeus, specimen from Somali $(\times 65), 1$, volsella $(\times 341)$.
and sharp, subbasal tooth, or cleft and subbasal tooth-ill-defined, or (Sri Lanka) subbasal tooth rounded; preapical tooth absent. Clypeus (Fig. 78a, b): disk without teeth or carinae; free margin weakly, evenly arcuate, depressed mesally in some specimens, mimutely, shallowly emarginate in some specimens; cor-
ner well-defined, distance between corners $2.7-3.3 \times$ distance between corner and orbit. Gena simple. Distance between hindocellar scar and orbit about $0.7 \times$ scar length. Flagellomere I: dorsal length $1.75-2.0 \times$ apical width. Pronotum: precollar not carinate laterally except finely carinate in Somalian females, side

nol sulcate. Forecoxa simple in most specimens, but shallowly concave and weakly marginate anteriorly in Somalian and some Egyptian females as well as in single female from United Arab Emirates. Forebasitarsus with 6 or 7 rake spines: length of apical spine $2.0 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine $0.6-0.7 \times$ apical width of tarsomere. Tarsomeres V mainly with two basoventral spines, one placed obliquely behind the other, but with one, three, or four such spines in some specimens; in most specimens also with two spines at each lateral margin (Fig. 79a, b); foretarsus may have fewer spines than remaining tarsi. Sternum II glabrous apicomesally (only narrowly so in female from Bahrain), but setose throughout in female from Zagado, Niger. Pygidial plate covered with stout setae that largely obscure integument. Length 6.57.5 mm in mosi specimens, but up to 8.0 mm in females from Somalia.
ô.-Mandible: inner margin without subbasal tooth. Clypeus (Fig. 78f-h): lobe obtusely pointed (sharply pointed in Somalian males), not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about $0.8 \times$ sear length. Flagellomere I: dorsal length 1.2-1.3 $\times$ apical width. Foretrochanteral notch slightly shorter to slightly longer than distance that separates it from trochanteral apex (Fig. 79c), its bottom with ill-defined row of appressed setae (Fig. 79d). Forebasitarsus with 3-5 rake spines: longest spine 1.3-1.5 $\times$ apical width of basitarsus. Dorsum of midbasitarsus with no to three preapical spines, dorsum of hindbasitarsus with one or two such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna without median depressions, minutely, closely punctate throughout except sterna III and IV impunctate apically: sterna III and IV (except basally) conspicuously fimbriate, fimbriae fully concealing integument, slightly curving ventrad apically (Fig. 79e, f). Sternum VIII rounded apically or searcely emarginate. Volsella: Fig. 78i. Length $5-6 \mathrm{~mm}$.

Geographic Variation, - Various populations of moricel difler in color of femora and tibiae, as discussed below.

North and West Africa. Arabian Peninsula. Female femora reddish, pale yellow apically (forelemur red in single female from Lawdar. Yemen; red replaced by black on fore- and part of midfemora in many females from Mali, Niger, and Senegal, largely so on all femora in females from Togo, single female Irom Untled Arab Emirates, and single female from Asir. Saudi Arabıa); tibiae reddish ventrally, pale yellow dorsally. Male femora reddish. pale yellow apically and apicoventrally or red replaced by black on fore- and midfemora: tibiae reddish, pale yellow dorsally (foretibia pale yellow on outer side).

Oman. Salalah Island. Female femora black. pale yellow apically. Male femora black, yellow apically. As indicated under Description above, these specimens have the gaster predominantly brown, and the fimbriate area of male sterna III and IV does not extend to lateral margin (in this regard, the males from Salalah Island resemble sanctus, but the clypeus and volsella are as in other moricei).

Somalia. Female femora black, pale yellow apically; tibiae reddish ventrally, pale yellow dorsally. Male femora black, pale yellow apically and apicoventrally; tibiae reddish, pale yellow dorsally. Unlike specimens from other areas, pronotal collar finely carinate laterally in female, and clypeal lobe sharply pointed in male.

Pakistan. Female femora light brown to red, pale yellow apically: tibiae reddish ventrally. pale yellow dorsally. Male femora reddish, pale yellow apically and apicoventrally: tibiae reddish, pale yellow dorsally.

Tajikistan. In both sexes femora black, pale yellow apically and apicoventrally, and tibiae reddish ventrally and pale yellow dorsally.

India. Femora varying from red to black. Tibiae yellow dorsally and reddish ventrally (outer face yellow on the foretibia) in lightest specimens. largely black except yellow basodorsally in the darkest ones.

Sri Lanka. Female legs all black or femora pale yellow apically. Male femora reddish brown, pale yellow apically and ventrally: tibiae reddish brown, foretibia yellow dorsally, hindtibia with varying amount of yellow markings dorsally.

Thailand. Female legs all black except tibiae minimally yellow at base. Male femora black except yellow apically; tibiae red but yellow dorsally (foretibia yellow on outer face): foretarsus yellowish, mid- and hindtarsi brown.

Geographic Distribution (Fig. 77). - Africa from Mediterranean Coast to Togo, Sudan, and Somalia; Arabian Peninsula, Israel to Tajikistan. India. Sri Lanka, and Thailand.

Records.-ALGERIA. Ain Salah ( 1 \&, KMG), Biskra (1 \&, MZL).
BAHRAIN: Bahrain Island (1 \&, BMNH).
BURKINA FASO: Gourma Kompıenga 20 km S Pama (lq, LEM).
COMMONWEALTH OF INDEPENDENT STATES: Tajikistan: Aral on Vakhsh River (28, 1 \&; ZIN). Kolkhozabad Disintel: 7 km E Garauly, E shore of Vakhsh River, near Y'angrabad (Kazenas, 1980), 10 km NE Garauty (1 \&, VLK; $\ddagger \delta, V L K$, paratypes of fimbratus).
EGYPT: Al Fayyum Kom Osheım on Caıro-Fayum road (2 t, CAS; 18 , CGR). Al Jizah (= Ghıza): Abu Rawash (29, 6 of, CAS; 1 \&, 1 o, CGR), Ghıza Pyramıds
 CAS), Hawamdieh (Honoré, 1942:53). Kerdasa (1 3. CGR). Al Qahirah (= Carro):
 1 oै, NHMW). Al Qanal: Ismallya (1 סै, FSCA). Al Sahra al Janubiah: Dakhla Oasıs Al Quast ( 1 o, 1 f, CGR). Aswan: Aswan ( 58.8 8, CAS), near Kom Ombo temple ( 5 o. CAS). Asyut. Asyut ( $10, \mathrm{KMG}$ ). As Sahra al Gharbiyah: Bir Hooker (18., CAS) and Deir Abu Magar (2 of, CGR) in Wadı Natrun. 35 km E Wadi Natrun (28, CGR). Luvor: 3 km W Luxor (18, CAS). Sina ( $=$ Sinal): between Dahab $\left(28^{\circ} 29^{\prime} \mathrm{N}, 34^{\circ} 32^{\prime} \mathrm{E}\right.$ ) and St. Cathenne Monastery (18.6 5. AAM), Wadi Khreza, circa 45 km N Sharm el Sheikh (20, AAM).

GAMBIA Banjul (18, 1 ठ, KMG).
INDIA Gujarat: Deesa ( 8,3 \&, CAS). Rajasthan. Jaisamand Wildlife Sanctuary, 45 km SSE Udapur (28, CAS).

ISRAEL: En Gedı (de Beaumont, Byınskı-Salz, and Pulawskı, 1973).
LJBY'A. Cyrenaica Benghası (von Schulthess, 1926). Tripolitania Tripoli (2 2. BMNH, 1 \&, MZL).

MALI: 30 km S Ansongo ( 1 f, KM ) ), Douentza ( 1 f, CAS, 1 8, 1 8, MS), 40 km
 (28,23, CAS, 1 \&, 1 \%, MS), 158 km SW Gao ( 18,18 . CAS), 180 km SW Gao
 30 km NE Hombon (2 9, $118, \mathrm{MS}), 45 \mathrm{~km}$ W Mopii (2 8. CAS).

MAURITANIA. 20 km NE Akjoujt (I 8, CAS), 20 km NE Aleg ( $28, \mathrm{CAS}$ ),
 NE Nouakchot1 (58, CAS), 153 km NE Nouakchot1 (12 8,2 8, CAS), 30 km S
 CAS), Oued Segellı 25 km S Atar (18, CAS), Oued Tayart 30 an km NW Atar (18. CAS), Tayart 7 km W Atar (18. CAS), Rachid 40 km NW Tıdıikja (18. CAS).

MOROCCO. Marrakech (1 \&, MZL).
NIGER: Aır Massıf: Zagado wadı, $18^{\circ} 48^{\prime} \mathrm{N}, 9^{\circ} 10^{\prime} \mathrm{E}(1$ \&. 1 万ै, BMNH), Gazaoua, $13^{\circ} 33^{\prime} \mathrm{N}, 7^{\circ} 54^{\prime} \mathrm{E}(18, \mathrm{CAS}: 18,13$, FSAG $)$.
 al $23^{\circ} 36^{\prime} \mathrm{N}, 58^{\circ} 26^{\prime} \mathrm{E}(18, \mathrm{PMA})$, Qurum ( $\left.1 \circ, \mathrm{KMG}\right)$, Ruwi (18, KMG), Oman: Masrah Island (19, KMG)

PAKISTAN Punjab Chenab River bank, 27 km SW Multan (18, CAS), Fars alabad (I P. CAS). Lal Suhandra National Park, 34 km SE Bahawalpur (19, CAS).

Sind: Karachi (28,18, BMNH) includıng Clifton Beach (4 91 of, CAS), Manora Island (428, 24 8, CAS; 1 8, ZMK), and Sandspit Beach (699 8, CAS; 1 ס, ZMK); Kirthar National Park 150 km NE Karachi, $25^{\circ} 10^{\prime}-26^{\circ} 05^{\prime} \mathrm{N}, 67^{\circ} 10^{\circ}-67^{\circ} 55^{\prime} \mathrm{E}$ (28, CAS); Malir River bed, 5 km ESE Karachi International Aırport (28, 11 है, CAS)

SAUDI ARABIA: Asır, Wadi Lasaba (18, BMNH), Bahra, Jeddah (1 8, KMG), El Riyadh ( 18 , WL), Haddat Ash Shim, $21^{\circ} 47^{\prime}$ N, $39^{\circ} 39^{\prime} \mathrm{E}(1$ 8, BMNH).

SENEGAL: Dagana ( 1 ס., AAM: 28,8 of, CAS), 5 km SE Diourbel ( 3 万ै. CAS), 16 km N Fatick ( $1 \mathrm{\delta}, \mathrm{CAS}$ ), Linguère ( 1 ô, CAS), 15 km W Linguère ( $1 \mathrm{8}, 1$ ô, CAS), 40 km ESE Louga ( 18,7 b, AAM; 18,108, CAS), 40 km NE Sı. Lour ( 1 8. CAS), Ndangane 45 air km SE Mbour ( 1 \&, 2 o, CAS), 3 km NW Samba Dıa $=70$ air km W Kaolack ( 18,38 , AAM, 38,4 万, CAS), $25-35 \mathrm{~km} \mathrm{~S}$ Richard Toll (28.CAS; 13 \&, LUW; 18 8.28. ZMA), Tiougoune (18, CAS; 28, FSAG).

SOMALI: Berbera (28, 2 $0, \mathrm{BMNH} ; 18,1$ of, CAS).
SRI LANKA (USNM unless indicated otherwise): Anuradhapura District: Hunuwilagama (28). Padaviya ( 18,1 8). Colombo District: Pamunugama (28 CAS; 38 ), Uswetakeiyawa ( 2 8, CAS; 48,20). Hambantota District: Bundala Sanctuary. Circuit Bungalow ( 6 \&, CAS; 128,5 ) , Palatupana Tank (18), Palatupana WLNPS
 District: 0.5 mi NE Kokmotte in Wilpattu National Park (1 8, 3 f, CAS; 68.6 8), Marichchukkaddı (18), Ma Villu (28, 5 8, CAS; 68,7 8), Pesalai Beach (28). Monaragala District: Mau Aru 10 mı E Uda Walawe (18), Nilgala (18, CNC). Puttalam District: Wilpattu Nahonal Park, Kalı Villu (I \&. CAS). Trincomalee District: Tennamaravadı (1 8). Tnncomalee, China Bay Rıdge Bungalow (2 ס, CAS; 28,58 ), 7 m W Trincomalee ( 1 8, CAS, 18,2 8). Vavuniya District: Parayanalankulam Irrigation Canal $25 \mathrm{mı}$ NW Medawachchıya (18, CAS; 18.2 ס).

SUDAN: Ed Damer Hudeıba ( 1 §. CAS).
THAILAND: Phetchaburi: Cha-am (18.28, CAS).
TOGO: 5 km W Sokodé ( 2 \&, CAS).
TUNISIA: Djerba Island (18, CAS; 281 o, KMG), Tabarka (18, CAS; 1 \&. KMG), Tozeur ( 1 \&, JG; 1 ס, MS).

UNITED ARAB EMIRATES: Dubai: Awir (18, CAS), Nakhali (18CAS).
YEMEN: Aden: Khormaksar ( 18, BMNH), Mohur (a beach circa 15 km from center of Aden) ( 1 \&, 1 \%, AAM; 1 ठ, CAS), Lawdar (spelled Lodar, 1 \&, BMNH).

## Gastrosericus nama sp. n.

(Figures 80-82)
Derivation of Name. - Named after the Nama people, a Hottentot tribe who immigrated from South Africa into the central Namib; a noun in apposition to the generic name.

Diagnosis. - Gastrosericus nama is unique in combining long, suberect setae between the mandible and occipital carina (setal length about $0.7 \times$ basal width of mandible) with straight, appressed setae on the frons, scape, mesopleuron, and hindfemur. The arcuale free margin of the clypeal lobe (Fig. 80a, c) is a subsidiary recognition feature for both female and male.

Description. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin broadly emarginate. Orbit slightly closer to hindocellar scar than to antennal socket. Propleuron near hindmargin with shiny, triangular elevation that is slightly raised posierad. Scutum and mesoplcuron with welldefined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 2.2-2.4 $\times$ apical truncation. Recurrent veins separate.

Setae straight, appressed on scape, femora and thorax but nearly erect adjacent to oral fossa and between propodeal side and hindface, hiding mesopleural integument: those adjacent to oral fossa about $0.7 \times$ basal width of mandible.

Head black but flagellum brown (yellowish brown ventrally) and the following are pale yellow: mandible (excepi dark brown apically), clypeus, and scape (except light brown dorsally). Thorax black but pronotal lobe, tegula, and humeral plate pale yellow. Gaster red. Femora black, yellow apically (black largely replaced by red in some specimens). Tibiae light red, yellow
dorsally or (foretibia) on outer side. Tarsi light red. Wings hyaline.
8. - Mandible (Fig. 80b): inner margin with low, arcuate expansion in place of basal tooth, cleft vestigial, preapical tooth present. Clypeus (Fig. 80a): disk without teeth or carinae; free margin of lobe arcuale, corner well-defined; distance between corners $2.3 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about equal to scar length. Gena simple. Flagellomere I: dorsal length $1.75 \times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 6 rake spines: length of apical spine $2.0 \times$ apical width of basitarsus. Foretarsomere lV: length of inner apical spine $0.8 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum II apicomesally with glabrous, triangular area. Pygidial plate covered with stout setae. Length $6.5-7.0 \mathrm{~mm}$.
of. - Mandible: inner margin without subbasal tooth. Clypeus (Fig. 80c): free margin of lobe arcuate, not angulate laterally, forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about $0.9 \times$ scar length. Flagellomere 1: dorsal length $1.5-1.8 \times$ apical width. Foretrochanteral noich about as long as distance that separates it from trochanteral apex (Fig. 81), its bottom simple. Forebasitarsus with 4 rake spines; longest spine $1.7 \times$ apical width of basitarsus. Dorsum of mid- and hindbasitarsus each with two preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna III and IV (except laterally) with fimbriate depressions, fimbriae appressed basally and fully concealing integument, curved ventrad apically: sterna V and VI with straight setae that delimit apical depression and with numerous shorter setae. Sternum VIll rounded apically. Volsella: Fig. 80 d . Length $7.0-7.8 \mathrm{~mm}$.

Geographic Distribution (Fig. 82).-Namibia and adjacent part of Sourh Africa.

Records. - Holotype: 9 , NAMIBIA• Swakopmund District: Gobabeb al Kuseb River bed, 25 Jan 1987, O. Lomholdt (ZMK). Paratypes: NAMIBIA: Kaokoland Marienfluss, $4-8 \mathrm{~km}$ N Otjinungwa, collector unknown (18, SMNW); Otınungwa. 17-22 Nov 1970, collector unknown (I 8, CAS). Keetmanshoop District: Noachabeb, 7-12 Jan 1972, collector unknown (1 ס, CAS). Swakopmond District Gobabeb, same data as holotype ( $18,2 \mathrm{MK}$ ), Lower Ostrich Gorge, $22^{\circ} 30^{\prime} \mathrm{S}, 14^{\circ} 58^{\prime} \mathrm{E}$, 23 Oct-20 Nov 1984, J. Irish and H Liessner (18. SMNW).

SOUTH AFRICA: Cape Province, 20 km N Pofadder, 25 Nov 1990, R. Miller and L. Stange ( 18, CAS, $1 \&, 18$, FSCA).

## Gastrosericus neavei Turner

(Figures 83-85)
Gastrosericus neavei Turner, 1913:754, \&. Holotype: \&, Kenya: upper Kuja River (BMNH), exammed - Turner, 1916:258 (in Parallelopsis, misspelled Paralellopsts); Arnold, 1922:125 (redescription), 1930:2 (11sted): Schouteden, 1930:91 (Zarre); Bohart and Menke, 1976:255 (forewing illustrated), 256 (listed). 279 (male sternum VIII illustrated), 280 (male gemitala illustrated).
Parallelopsis africana Maidl, 1914:147, s. Holotype: of. Senegal: Thiès (PORTICI), exammed. Synonymized with Gastrosericus neave by Arnold. 1922:125.
Gastrosericus neavei reversa Arnold, 1951:157, 8, 8, incorrect termination for reversus. Lectotype: \&, Nali: Tiltembeya on Niger River (BMNH), present designation, examined. New synonym

Diagnosis. - Gastrosericus neavei differs from its congeners in having straight, crect setae on the vertex and thorax (setae markedly longer on the vertex than between the mandible and occipital carina), and the punctures are coarse on the frons, vertex, and thorax (several times larger than genal punctures


adjacent to orbit). The metapleural flange is slightly broader than in the other species. The shape of the female pronotum is shared with fluviatilus, rothneyi and some vedda (precollar simple but side sulcate), and the female clypeus is similar as in fluviatilis, and rothneyi (Fig. 83a, b).


Fifilirf 81 Gastrosericus mama male forequchanter ( 217 )

Sinonymy. - Arnold (1951) claimed that Gastrosericus nearei reversus is unique among Afrotropical Sphecidae in having the setae of the propodeal dorsum directed cephalad. In reality, this orientation is found in all Gastrosericus (at least mesally) and in many other Larrinae, e.g. in most Tachysphex. The syntypes ol reversus and other West African individuals differ slightly from equatorial and southern African specimens in the propodeal pilosity (see Variation below), but these various forms are connected by intermediates. Because of the intermediates I do not recognize subspecies and, consequently, I regard reversus as a synonym of neaver.

Description. - Mandible: posterior margin notehed, abductor ridge present (inconspicuous in some specimens). Labrum: free margin acutely emarginate. Orbit closer to antennal socket than to hindocellar scar. Propleuron simple. Frons, vertex and thorax coarsely punctured, punctures markedly larger than those on gena adjacent to orbit; less than one diameter apart on mesopleuron. Scutal flange evenly curved throughout. Metapleural flange broader than in other Gastrosericus. Marginal cell: length of costal margin 4.2-5.4 $\times$ apical truncation. Recurrent veins interstitial above or confluent in a petiole.

Setae erect on vertex, adjacent to oral fossa, and on thorax, not obscuring mesothoracic integument; setal length (expressed as fraction of basal width of mandible): 0.5 on vertex and 0.3 adjacent to oral fossa.

Head, thorax and gaster black except tegula pale yellow an-

$15^{\circ} \quad 0_{0}^{\circ}$
$\begin{array}{cc}1 \\ 15^{\circ} & 30^{\circ}\end{array}$
$30^{\circ} \quad 45^{\circ}$
$60^{\circ}$
Figure 82. Collecung localites of Gastrosertcus nama and prepheros
teriorly in many specimens (also humeral plate mesally in some). Femora black, with pale yellow apical spot in some females and most males (spot largest on forefemur, smallest on hindfemur). Tibiae: see below. Tarsi black, apical article in many specimens reddish or yellowish. Wings markedly infumate except moderately so in Kenyan specimens and in males from Transvaal. 9.- Mandible (Fig. 83c): inner margin with subbasal tooth; cleft obtusely angulate: preapical tooth absent. Clypeus (Fig. $83 \mathrm{a}, \mathrm{b}$ ): disk without teeth or carinae; free margin of lobe concave laterally, mesally with almost rectangular prominence that is roundly truncate to obtusely tridentate at apex, corner well-
defined; distance between lobe corners about $2.5 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $2.5 \times$ scar length. Gena with tooth below midheight near occipital carina (Fig. 83d). Flagellomere 1: dorsal length $1.6-1.75 \times$ apical width. Pronotum: precollar not carinate laterally, side sulcate. Forecoxa shallowly concave near inner margin, foremargin expanded into low tooth admesally (Fig. 83e). Forebasitarsus with 4-6 rake spines; length of apical spine about equal to apical width of basitarsus. Foretarsomere IV: length of inner apical spine $0.6-0.7 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Ster-


Figure 83 Gastroseritu nedut: a, female head frontally ( $\times 27$ ), b, lemale dypeus ( - 44), c, lemale mandible ( 70 , d, female head laterally (v 36 ), e. female Forecoxa ubliquely from the side ( $\times 78$ ) : 1, male head frontally ( $\times 30$ ), g, male clypeus $(\times 67)$; , volsella ( $\times 200$ )
num II apicomesally with glabrous, apicomesal area. Pygidial plate (except basally) covered with stout setae that largely conceal integument. Length $7.5-8.0 \mathrm{~mm}$.

Fore- and midtibiae all black or pale yellow dorsally (except on apex); hindtibia black, with pale yellow dorsum.
8.-Mandible: inner margin with obtuse subbasal tooth. Clypeus (Fig. 83f, g): lobe pointed, not angulate laterally, its free
margin forming single curved line with rest of clypeal margin. Flagellomere I: dorsal length $1.75 \times$ apical width. Distance between orbit and hindocellar scar about $2.0 \times$ scar length. Foretrochanteral notch shallow, longer than distance that separates it from trochanteral apex (Fig. 84), its bottom glabrous, delimited anteriorly by erect setae. Forebasitarsus with $0-5$ rake spines; longest spine about equal to apical width of basitarsus.

Dorsum of mid－and hindbasitarsus in most specimens without preapical spines（but midbasitarsus with a rudimentary spine in a male from Kamanjab area，Namibia）．Inner claws of mid－ and hindtarsi insignificantly smaller than outer ones．Pygidial plate setose．Sterna without mesal depressions，minutely，closely punctate throughout；sternal setae short，uniform．Sternum VIll rounded apically．Volsella：Fig．83h．Length $5.8-8.5 \mathrm{~mm}$ ．

Foretibia all black or with pale yellow outer side，mid－and hindtibiae black with pale yellow dorsum．

VARIATION．－The posispiracular carina is expanded at the ventral end in specimens from Senegal and Mali，even the small－ est ones．The carina is the usual form（not expanded）in examples from other areas．

Individuals from Gambia，Guinea，and Senegal as well as some from Mali differ from other specimens in having the me－ dian setae of the propodeal dorsum slightly denser and more appressed；these setae thus contrast with the remaining pro－ podeal vestiture（median setae not contrasting in many other specimens studied）．However，the setae look alike in some spec－ imens from Mali（a paralectotype of reversus）and some from Zimbabwe．

Life History．－Unlike other Gastrosericus，specimens of neavei that I collected were flying around or walking on some broadleaf plants，（about $0.5-1.5 \mathrm{~m}$ tall）rather than on the ground．Wasps were also active in light rains，e．g．，at the begin－ ning of a storm，and often reappeared when the sky was still covered with clouds．Possibly，the unusually long setae of neavei correlate with this ability to fly during a rain and protect the body from water drops．

A female from Lingadzi，Malawi，is pinned with prey，a nymph of a geophilous grasshopper，Acrotylus sp．（Acrididae，Oedi－ podinae，det．N．D．Jago）．

Geographic Distribution（Fig．85）．－Souih Africa north to Senegal，Mali，Niger，and Kenya．

Records．－ANGOLA：Bruco（2 $\delta, \mathrm{BMNH}), 10 \mathrm{~m}$ NE Cacula（18，BNNH）． BOTSWANA：Nata（ 18 B．AEI），Serowe（ 28,1 b，CAS， 18, NCIP， 5 \＆， 1 of， USNM，2\＆， 4 b，ZMK）．

BURKINA FASO：Gourma Kompienga 20 kmI S Pama（ 4 \＆， 3 8，LEM）．
CENTRAL AFRICAN REPUBLIC：Kembe， $4^{\circ} 29^{\prime} \mathrm{N}, 21^{\circ} 53^{\prime} \mathrm{E}(18,1$ \＆, HD$)$
CHAD：N＇Djamena（ 18, ZMA）．
GAMBIA：Keneba（ $38,18, \mathrm{BMNH}$ ）．
GUINEA：Kouruoussa（ 1 8，MNHN）．
IVORY COAST Katiola（ 12,1 f，ZMA）．
KENY＇A：Archer＇s Post on Ewaso Ng＇iro River（48，28，CAS），Diani Beach near Mombasa（2 8，MCZ，UCD），upper Kuja River（ 1 \＆，BMNH，holotype of neavei），Tiwi Beaches， $4^{\circ} 14^{\prime} \mathrm{S}, 39^{\circ} 36^{\prime} \mathrm{E}$（ 1 ह，ZMK）．

MALAWI Chintheche（1 of，MRAC），Lingadzı（ $18, \mathrm{BMNH}$ ）
MALI 25 and 30 km N Bamako（128．2 8, CAS；208， 5 古，MS）， 10 km E Mopt （ 3 q，CAS； 1 b，MS）， 45 km W Mopı（ 3 8，CAS； $28, \mathrm{MS}$ ）， $5 \mathrm{~km} \mathrm{~S} \mathrm{San} \mathrm{( } 18, \mathrm{MS}$ ），
 （ 1 \＆，BMNH，determıned as reversa by Arnold，possibly a syntype）．Tillembeya on Niger River，approximately $14^{\circ} 00^{\prime} \mathrm{N}, 4^{\circ} 00^{\prime} \mathrm{W}\left(28,38^{\circ}\right.$ ，BMNH，lectotype and paralectotypes of reversus）．

MOZAMBIQUE：Moamba（ $\overline{\text { B，ZMA）．}}$
NAMIBIA Kavango Gebied：Rundu（18，CAS）；20，25，and 40 km E Rundu （18，JG；38，MS）．Karibib District Ameıb Farm 19 ml NW Karıbb（ 1 \＆ Okahandja District：Okahandja（ 1 \＆，AMG）．Outjo District 31 km SE Kamanjab （ 1 f，CAS； 2 8，MS），Ugab River 11 km SE Outjo（ 18,18, CAS ）．Tsumeh District 10 km SE Tsumeb（18，MS）．Windhoek District．Bismarck River 30 km E Wind－ hoek（ 1 ס，CAS），Windhoek area（ 1 Q，UCD）．

NIGER：Madoua， $14^{\circ} 04^{\prime} \mathrm{N}, 5^{\circ} 57^{\prime} \mathrm{E}$（ 1 \＆，FSAG），Niamey（1 \＆．JH， 1 of，KMG： 1 ó，LUW）．

SENEGAL：Dakar（18，MNHN）；Kédougou（18，CAS； 28 ，FSAG），Mbour（1 ó，MNHN），Ndangane 45 air km SE Mbour（ 1 है，AAM），Tambacounda（2 है，CAS；


Figure 84．Gastrosericus neaver：foretrochanter（＊ 158 ）．

1 \＆， 6 8，FSAG），Thiès（ 1 z．，PORT1C1，holotype of africamus）， 5 km SW Thiès（2 o，CAS），Zingunchor（ 18,1 s．FSAG）．
SOUTH AFRICA：Natal：Hluhluwe Game Reserve（ 1 B．，AEI），Jozmi（2 $\mathfrak{b}, \mathrm{CAS}$ ， UCD），Muden（ 18.18 ，AEl），New Hanover（ $18, B M N H$ ），Weenen（ 18,1 fo． BMNH）．Transvaal．Afguns（ 18, AMG）．Bloemhof（ 1 o，AMG），Buffelspoort Dam （ 18,2 8， $\mathrm{AMG} ; 18$. CAS），Constantıa Ranch 5 km S Kaapmuiden（18，CAS）， Durwelskloof， $23^{\circ} 42^{\prime} \mathrm{S}, 30^{\circ} 06^{\prime} \mathrm{E}(18$, NCIP），Elhsras（18，AMG），Klerksdorp（2 8．AMG： 1 ó，CAS），Loskopdam Nature Reserve， $25^{\circ} 25^{\prime} \mathrm{S} .29^{\circ} 20^{\prime} \mathrm{E}(18, \mathrm{NCIP}$ ）， Messina（ 3 2． 1 f．AMG），Modjadıı Nature Reserve， $23^{\circ} 38$ S， $30^{\circ} 20^{\prime}$ E（ 1 8，NCIP）， Mogol Nature Reserve， $23^{\circ} 58^{\prime} \mathrm{S}, 27^{\circ} 45^{\prime} \mathrm{E}(48,43$ ，NC1P），Mooketsi（2 2 ，USNM）， Nylsvlei Nature Reserve， $24^{\circ} 39^{\prime} \mathrm{S}, 28^{\circ} 42^{\prime} \mathrm{E}$（18， 1 8 \％，NCIP），Funda Mhla（1 of， ZMA）and Pafun in Kruger National Park，22026＇S，31毝E（3 ${ }^{\circ}$ ，NClP），Pretona （18，CU），Pretona：Faene Glen at $25^{\circ} 46^{\prime} \mathrm{S} 28^{\circ} 17^{\prime} \mathrm{E}(18$, CAS）， 43 km N Prelona （I $8, \mathrm{MS}$ ），Rustenburg（ 2 \＆，AMG，RMNH），Rustenburg Nature Reserve， $25^{\circ} 40^{\prime}$ S， $27^{\circ} 1^{\prime} \mathrm{E}$（ 3 8，NCIP），Sabie River Bungalows（19，AMG），Silverton（18，AMG）， Soutpan in Pretona District，25 2 $24^{\prime} \mathrm{S}, 28^{\circ} 06^{\prime} \mathrm{E}(18$ 名，CAS； 1 \＆， 1 ठै，NCIP）， 5 mi W Warmbad（28， 2 古，USNM），Zebediela in Mogoto Nature Reserve（24＊15＇S，2913＇E （ 28 ，NCIP）．
TANZANIA：Dar Es Salam：Bahan Beach（19．CAS；128． 28, ZMA），Manyara Lake（ 1 3，USU），Namawala in Kilombero District（ 1 8． 1 8，Ll W）．

ZAIRE：Kasai Oecidental：Tshikapa（18，MRAC）．Shaba：Kaleme（18，CL）， Kamma（1 \＆，MRAC；possibly a localıty of the same name in Kasaı Oniental）． Zaire Central：Boma，cırca $6^{\circ} 00^{\prime} \mathrm{S}, 13^{\circ} 00^{\prime} \mathrm{E}(1 \mathrm{q}, \mathrm{MRAC}$ ）．Also：Masosa（1 8， FSAG），a locahty not listed in available gazetteers．
ZAMBIA：Chilanga 15 km S Lusaka at $15^{\circ} 34^{\prime} \mathrm{S} 28^{\circ} 16^{\prime} \mathrm{E}(1 \mathrm{~g}, 18, \mathrm{CAS}), 9 \mathrm{~km}$ SW Kalomo at $17^{\circ} 04^{\prime} \mathrm{S}, 26^{\circ} 25^{\prime} \mathrm{E}(1 \mathrm{P}, 1 \mathrm{f}, \mathrm{CAS}), 25 \mathrm{~km}$ E Lusaka at $15^{\circ} 21^{\prime} \mathrm{S}$ ， $28^{\circ} 30^{\prime} \mathrm{E}(18, \mathrm{CAS}), 6-18 \mathrm{~km}$ SW Mfuwe at $13^{\circ} 07^{\circ} \mathrm{S}, 31^{\circ} 45^{\prime} \mathrm{E}(18,18, \mathrm{CAS}), 32 \mathrm{~km}$ E Petauke at $14^{\circ} 17^{\prime} \mathrm{S}, 31^{\circ} 37^{\prime} \mathrm{E}(1 \mathrm{~s}, \mathrm{CAS})$ ．

ZIMBABWE：Bulawayo（2 ס，CAS， 1 \＆CU 1 \＆UCD）．Chishawasha near Harare（ 68,12 3．，BMNH， 3 8，CAS），Hwange（ $18, \mathrm{CAS}$ ），Khamı Rums at $20^{\circ} 09^{\circ} \mathrm{S}$ ， $28^{\circ} 26^{\prime}$ E（ 18 ，AMG； 18 ，CAS），Matobo（ 18 ，USNM）， 11 km NE Nyamandhlovu at $19^{\circ} 48^{\prime} \mathrm{S}, 28^{\circ} 16^{\prime} \mathrm{E}\left(1 \delta^{\circ}\right.$, CAS， 1 ․ 18 ．NHMZ），Sawmulls（ 1 名，MRAC： 18 ，UCD， 48． 1 s，USNM），Trelawney Research Station（18．1 s．AMG），Victona Falls（1 8．CAS）

## Gastrosericus pnepheros sp．n．

（Figures 82，86，87）
As Gastrosertus gughae：Pulawski，1904：111（descrption of 8）．
Gastrosericus pnepheros Pulawski：Dollfuss， $1989: 9$（nomen nudum；paratype in NHMW）．

Derivation of Name．－Pnepheros was a local god of the ancient Egyptians in Karanis，where the holotype was collected．

Diagnosis．－Gastrosericus phepheros has a shiny，iriangular elevation on the propleuron（as in Fig．143b），the setae are sinuous on the head and thorax（setal length，adjacent to oral

$15^{\circ} \quad 30^{\circ}$
$45^{\circ} 60^{\circ}$

Figure 85. (ollecing localities of Gavorometion heave
fossa, about equal to basal mandibular width), and semierect on the upper frons as well as scapal and hindfemoral venters. In addition, the clypeus is yellow, with the free margin of the lobe arcuate in the female (Fig. 86a) and roundly pointed in the male (Fig. 86d). The female is unique among species with long genal pilosity in having two or three conspicuous basoventral spines on each apical tarsomere (Fig. 86c). The male of shestakov is similar (female unknown), but in pnepheros the marginal cell is longer (length of costal margin 2.4-3.0 $\times$ apical truncation instead of 1.1-1.2).

DESCRIPTION. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin roundly emarginate. Orbit
closer to hindocellar scar than to antennal socket. Propleuron near hindmargin with shiny, triangular elevation that is slightly raised posterad. Scutum and mesopleuron with well-defined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 2.4-3.0 $\times$ apical truncation. Recurrent veins separate.
Setae sinuous on head and thorax, obscuring mesopleural integument: those adjacent to oral fossa about equal to basal width of mandible; semierect to erect on upper frons and scapal venter. semierect on hindfemoral venter.
Head and thorax black. but the following are pale yellow: clypeus, mandible (except apically), scapal venter, pronotal lobe

 volsella daterally $(\times 154) ; f$, volsella dorsally $(\times 154)$
(black in some specimens), tegula anteriorly, and humeral plate. Femora black; tibiae yellow dorsally, red brown ventrally. Tarsi all brown or yellow basally and brown apically. Wings hyaline.
9. - Mandible (Fig. 86b): inner margin subbasally with broad, shallow concavity that separates two low, rounded expansions. with preapical tooth. Clypeus (Fig. 86a): disk without teeth or carinae; free margin of lobe obtusely angulate (almost arcuate), concave on each side; corners rounded, ill-defined, placed almost at level of margin of lateral lobe; distance between corners $1.8 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $0.7 \times$ scar length. Gena simple. Flagellomere I: dorsal length $1.8 \times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 7 or 8 rake spines; length of apical spine $1.8 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine about $1.3 \times$ apical width of tarsomere. Venter
of tarsomere $V$ with two or three conspicuous basomedian spines (Fig. 86c). Sternum II with glabrous, triangular area apicomesally. Pygidial plate covered with stout setae that largely obscure integument. Length $11.0-11.5 \mathrm{~mm}$.

Gaster red or segments IV and V brown.
o. - Mandible: inner margin without subbasal tooth. Clypeus (Fig. 86d) obtusely pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about $0.7 \times$ scar length. Flagellomere I: dorsal length $1.6-1.9 \times$ apical width. Foretrochanteral notch shallow, about as long as distance that separates it from trochanteral apex (Fig. 87), glabrous and with no specially modified setae or unusual sculpture on bottom. Forebasjtarsus with 4-6 rake spines; longest spine $1.5-1.8 \times$ apical width of basitarsus. Dorsum of midbasitarsus with two to four preapical spines, dorsum of hindbasitarsus with two or three such


Ikotire 87. Gastrosericus phephem foretrochanter (. 158).
spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna III and IV (except laterally) with fimbriate depressions, fimbriae appressed basally and fully concealing integument, curving ventrad apically; sterna V and VI with sparse, stout setae that delimit apieal depression and with numerous
markedly shorter, subappressed setae. Sternum VIII rounded. Volsella: Fig. 86e, f. Length $6.5-7.5 \mathrm{~mm}$.

Gaster varying from mostly black (apieal depressions transIucent) to largely red (only segments III-V black).

Geographic Distribution (Fig. 82).-Egypt, Sudan.
Records. - Holotype: 3. EGYPT: Al Fayyum Province: Karanis, 25 May 1993. WJP (CAS). Paratypes: EGYPT: Al Fayyum: same data as holotype but 24 May (18, CAS), E Fayum, 30 May 1991, AMI (18, CAS); Kom Osheım, 9 May 1958, WJP ( 2 है, CAS); same data but 4 May ( 1 b, MZL); same locality, 25 May 1965, KVK (2 8, CAS, 4 万. USNM); same locality, 6 June 199J, AM (I 万. AAM), same localıty, 25 May 1993, WJP (1 9. CAS). AI Jizah (= Ghıza): Abu Rawash, 27 June 1937. AM (19. AAM), Saqqara, 31 May 1935 and Aug 1935, collector unknown (2 of ex coll. Mochı via A. Alfieri, USNM). As Sahra al Gharbiyah: Bahanya Oasıs: El Aguz, 8 Jul 1983, C. G Roche (1 8., CGR), Bahanya Oasıs, 25 May 1986, C. G Roche (! ס, CAS), Baharein in Siwa oasis, 13 June 1935, J. Omer-Cooper ( 1 \&, BNNH, determined as wattlu by J. de Beaumont). As Sahra al Janubiyah Kharga oasis, C. G. Roche, 7-8 June 1986 (2 8. CAS), 23 Jul 1988 (28, CGR), 31 Oct 1987 ( 18 , CAS).

SUDAN: Khartum, 1858, Natterer ( 1 \%, determined as waltlu by F. F. Kohl NHMW) (the label has three printed words, "Natt. 1858 Egypt", each on a separate line, with a handwniten "Chart." added to it): Nubian Desert, Nabardı [= Bir Um-Nahardı, 160 km SE Wadı Halfa]. O. Swale. 27 May 1906 and no date ( 28, BMNH), May 1907 and 28 May 1907 (29. 28, BMNH).

## Gastrosericus praos sp. n.

(Figures 88, 91)
Derivation of Name. - Praos, Greek for mild, meek, gentle, tame.




Figure 89. Gastrosericus pratensts: a, female head frontally ( $\times 23$ ), b. Jemale clypeus $(\times 37$ ); c. female mandible ( $\times 33$ ); d, female head laterally ( $\times 24$ ), e, female mesopleuron ( $\times 36$ ); f, pygidal plate $(\times 65)$, g, female forecoxa, large specimen ( $\times 56$ ), h, same, small specimen $(-65)$,, volsella $(\times 191)$.

Diagnosis. - The male of praos has a unique, broadly truncate clypeal lobe (Fig. 88a, b). The nonemarginate foretrochanter and largely glabrous sterna are also distinctive.

Description (based on holotype only).-Mandible with notched posterior margin, abductor ridge absent. Labrum: free
margin broadly emarginate. Orbit insignificantly closer to antennal socket than to hindocellus. Head occipital margin markedly curved in dorsal view (Fig. 88c). Propleuron simple. Thorax finely sculptured, but individual punctures discernible on scutum. Scutal flange evenly curved throughout. Marginal cell: length


Figure 90. (iastrosericus prutensas: a. male: fortrochanteral notch ( $\times 310$ ) b, same. bottom of notsh ( $\times 632$ ).
of costal margin $3.0 \times$ apical truncation. Recurrent veins confluent above in a short petiole.

Vestiture appressed, including setae adjacent to oral fossa (setae semierect between propodeal side and hindface), obscuring mesopleural integument.

Head, thorax, and gaster black, but the following are pale yellow: mandible (except apically), pronotal lobe, tegula, humeral plate, costal and subcostal veins; flagellum yellowish brown ventrally. Femora black, yellow apically. Tibiae pale yellow, red brown ventrally. Tarsi yellow, red brown apically. Wings hyaline.
Q.-Unknown
8. - Mandible: inner margin with subbasal tooth. Clypeus (Fig. 88a, b): free margin of lobe truncate, obtusely angulate laterally; distance between corners about $1.6 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $1.7 \times$ scar length. Flagellomere I: dorsal length about $1.2 \times$ apical width. Foretrochanter without notch. Forebasitarsus with 5 rake spines; longest spine slightly more than apical width of basitarsus. Dorsum of midbasitarsus with one preapical spine, dorsum of hindbasitarsus without such spmes. Claws shorter than in other species, only slightly exceeding arolium; inner claws of all tarsi as large as outer claws. Pygidial plate irregularly punctate (most punctures sparse, some close to each other), sparsely setose. Sterna without depression, largely glabrous. Sternum V1ll rounded apically. Volsella damaged in the only specimen studied, not reproduced here, penis valve unusual shape, markedly thickened basally (Fig. 88d). Length 4.7 mm .

Geographic Distribution (Fig. 91).-Known only from the type locality in Congo.

Records. - Holotype: s, CONGO Djoué 17 km W Brazzavalle, 17 Mar 1974, AM (CAS).

[^6]Diagnosis. - The female of pratensis has a partly yellow, unusually broad clypeal lobe (distance between corners about three times clypeal midlength), with a pair of minute tubercles near the center (Fig. 89a, b). The mesopleural ridge (Fig. 89e) and apically spinose forecoxa (Fig. $89 \mathrm{~g}, \mathrm{~h}$ ) are also distinctive, although the ridge is vestigial in small specimens.

In the male, the middle clypeal section is partly yellow (black at least basally), the lobe free margin is acutely pointed, the setae are appressed on the vertex as well as between the mandibular base and occipital carina, the femora are black or reddish brown but without yellow markings, and the gaster is largely black. Eastern African and southern African males of unicolor are similar and the two species can be distinguished only with difficulty. In most pratensts, tergum I is red basally (black in unicolor) and the inner and outer claws of each pair are equal in size. The inner claws are somewhat smaller than the outer ones in unicolor (specimens are $4.6-6.5 \mathrm{~mm}$ long), but also in the largest pratensis (about 8 mm long). Unlike modestus, pratenses lacks rows of erect sternal setae and the head is narrower in frontal view than in that species (see Fig. 75d, f)

Description. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin obtusely emarginate. Orbit insignificantly closer to antennal socket than to hindocellar scar. Propleuron simple. Thorax finely sculptured, mesopleuron and scutum minutely punctate. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.6-3.8 $\times$ apical truncation. Recurrent veins separate, interstitial above, or confluent in a short petiole.
Setae appressed on vertex and adjacent to oral fossa; appressed, slightly obscuring integument on mesopleuron; nearly erect between propodeal side and hindiace.

Head black; clypeus black basally, brown (female) or black apically, with a yellow band that is divided into spots in many males (one median and one on each side, or two median and one on each side, or only two median spots); mandible yellow except black apically; scapal venter brown red. Thorax black but pronotal lobe apically and tegula anteriorly pale yellow. Wings almost hyaline but forewing infumate apically (only


Figure 41. Collecting localities of cosirosericus praos and pratenses
slightly so in many males). Gaster largely black, segments with reddish preapical areas (also tergum I red basally in some specimens). Femora all red (some females) or partly black, hindfemur all black in some males; tibiae and tarsi red, hindtibia and in some males midtibia with pale yellow dorsum. Tarsi red or mid- and hindtarsi almost black.
9.- Mandible (Fig. 89c): inner margin with one rounded subbasal tooth and broad, shallow cleft but without preapical tooth. Clypeus (Fig. 89a, b): disk with two minute tubercles at or above center; lobe unusually wide (distance between corners 2.8-3.4 $\times$ clypeal midlength, and $3.1-3.8 \times$ distance between corner and orbit), its free margin weakly arcuate, corner well-defined.

Distance between hindocellar scar and orbit $1.9-2.2 \times$ scar length. Gena with tooth at level of mandibular base (Fig. 89d), tooth absent in smallest specimen studied. Flagellomere I: dorsal length $1.5-1.8 \times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Mesopleuron anteriorly with subvertical, slightly angulate ridge (Fig. 89e), but ridge evanescent in smallest specimen examined. Forecoxa simple except apex expanded into spine (Fig. 89 g, h) that is rudimentary in smallest specimen studied. Forebasitarsus with 5 or 6 rake spines; length of apical spine $1.5 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine $0.4-0.5 \times$ apical width of tarsomere. Venter of tarsomere V without preapical spines. Ster-


Figure 92. Giastrosernus pulehelles a, female head frontally ( $~=35$ ); b, female cly peus ( $\cdot 50$ ), c, female mandible ( $\times 55$ ), d, female head laterally ( $\times 34$ ); e, female pygidium ( $\times 65$ ) fi, male head frontally ( $\times 37$ ): g, male clypeus ( $\times 65$ ); h, volsella ( $\times 270$ ).
num I1 pubescent throughout or asetose apicomesally. Pygidial plate densely punctate (except basally), setae stout on apical third (Fig. 89 f ). Length $8.0-10.7 \mathrm{~mm}$.

む.-Mandible: inner margin obtusely angulate near base. Clypeus: lobe sharply pointed, not angulate laterally, its free
margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about $1.8 \times$ scar length. Flagellomere I: dorsal length $1.0-1.3 \times$ apical width. Foretrochanteral notch about as long as distance that separates it from trochanteral apex (Fig. 90a), its bottom almost glabrous


Figure 93. Gastrosericus pulchellus: a, male forctrochanter ( $\times 194$ ); bame: bottom of notch ( $\times 387$ ).
(Fig. 90b). Forebasitarsus with 3 or 4 rake spines; longest spine $1.2 \times$ apical width of basitarsus. Dorsum of midbasitarsus with no or one preapical spine, dorsum of hindbasitarsus without such spines. Inner claws of all tarsi as large as outer claws except inner claws slightly smaller in the largest specimens. Pygidial plate densely setose. Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum V11I notched apically (notch small to conspicuous). Volsella: Fig. 89i. Length $6.7-8.2 \mathrm{~mm}$.

Geographic Distribution (Fig. 91).-Namibia, Zimbabwe.
Records. - NAMIB1A: Grooffontein District: 40 km NE Groolfonten (18. JG; $18, \mathrm{MS}$ ). Kavango Gebied: Rundu ( $28, \mathrm{CAS} ; 38,1 \%, \mathrm{JG}, 28,18$, MS). Karibib District: 62 km E Karibıb ( 5 \&. 1 8, CAS; 28. MS) 43 km E Karibıb (1 \&, 1 8, MS). Okahandja District: 27 km S Okahandja ( $\mathrm{I}_{\mathrm{g}, \mathrm{CAS}}$ ). Omaruru District Olıikoko-Sud 612116 Ad [ $=$ between $21^{\circ} 15^{\prime}$ and $21^{\circ} 30^{\prime} \mathrm{S}$ and $16^{\circ} 15^{\circ}$ and $16^{\circ} 30^{\prime} \mathrm{E}$ ] ( 1 s, SMNW). Otjiwarongo District: 3 km NE Kalkfeld ( $19,58, C A S$ ), 20 km NE Otjiwarongo ( 2 of, CAS). Outjo District 31 km SE Kamanjab (2 $\delta$, CAS, 1 \&, 3 \%, MS). Rehoboth District: 23 km N Rehoboth ( 1 \&, 1 \&, CAS, 3 q, MS). Tsumeb District: Namutoni (19, ANG), 10 km SE Tsumeb ( 3 b, CAS; $1 \mathrm{\delta}, \mathrm{MS}$ ), 25 km SE Tsumeb (19, MS). Windhoeh District: 25 km N Windhoek ( $18, \mathrm{CAS} ; 18, \mathrm{JG}$; $18,18, \mathrm{MS}$ ), 28 km S Windhoek ( $1 \mathrm{~b}, \mathrm{CAS}$ ).

ZAMBIA: $6-18 \mathrm{~km}$ SW Mfue at $13^{\circ} 07^{\prime} \mathrm{S}, 31^{\circ} 45^{\prime} \mathrm{E}$ ( $28, \mathrm{CAS}$, NHMZ).
ZTMBABWE: Bembesi ( 1 f, SAM), Bulawayo ( $38,2 \delta^{\circ}$. SAM, including holotype and paratype females of pratensts), Gwanda (18, SAN), Khamı Rums at 20 $0^{\circ} 09^{\prime} \mathrm{S}$, $28^{\circ} 26^{\prime} \mathrm{E}$ ( 1 ó, CAS), Redbank at Khamı River, $20^{\circ} 00^{\circ} \mathrm{S}, 28^{\circ} 22^{\prime} \mathrm{E}$ ( 2 of, CAS).

## Gastrosericus pulchellus Arnold

(Figures 92-94)
Gastrosericus pulchellus Amold, 1929:383, ․ Holotype: 9, Zimbabwe: Rhodesdale (SANJ), examined.-Bohart and Menke, 1976:256 (listed).
Diagnosis. - The female of pulchellus has two genal teeth (Fig. 92d), of which the dorsal one is lower. Subsidiary recognition features are: clypeal lobe markedly sinuate, its free margin roundly prominent mesally and concave laterally (Fig. 92d); pronotal side deeply sulcate; and gaster black.

The male has an all black, acutely pointed clypeus (Fig. 92f, g), an all black gaster (with reddish zones in some specimens), and the setae are appressed between the mandibular base and the occipital carina and on the vertex. Also, the inner claws of mid- and hindtarsus are slightly smaller than outer claws and
the mandible has at least an evanescent abductor ridge. This combination is shared with fluviatills (West Africa), but in pulchellus (southern Africa) the propodeum is finely, uniformly sculptured; in fluviatilis, the sides of the propodeal dorsum and hindface have well-defined punctures with shiny interspaces. In addition, rows of erect sternal setae are inconspicuous in pulchellus while well developed in modestus (Fig. 75f), and sternum VIll is rounded to shallowly emarginate apically, while deeply emarginate in tuberculatus (Fig. 132a).

Description. - Mandible: posterior margin notched, abductor ridge present but evanescent in many specimens. Labrum: free margin broadly emarginate. Orbit slightly closer to hindocellar scar than to antennal socket in female, equidistant in male. Propleuron simple. Scutal punctures fine, inconspicuous. Scutal flange evenly curved throughout. Mesopleuron and propodeum uniformly microsculptured. Marginal cell: length of costal margin $3.2-4.2 \times$ apical truncation. Recurrent veins separate.

Vestiture appressed, including setae adjacent to oral fossa, obscuring mesopleural integument; propodeal setae semierect between side and hindface.

Head black; mandible yellow basally, black apically; clypeus either all black or reddish anteriorly (two females from Okahandja) or with small pale yellow spot mesally (one female from Okahandja). Thorax black except the following pale yellow: pronotal lobe apically, tegula, and humeral plate. Gaster either black, with translucent apical depressions of segments, or with small reddish area in front of depressions. Femora black (hindfemur reddish in two females from Okahandja), with large pale yellow spots apically (spots longer ventrally than dorsally). Tibiae yellow, pale ferruginous ventrally (mid- and hindlegs) or on inner face (foreleg). Tarsi ferruginous in female, largely pale yellow in male. Wings almost hyaline.
8.- Mandible (Fig. 92c): inner margin with one subbasal tooth. broad, almost rectangular cleft, and no preapical tooth. Clypeus (Fig. 92a, b): disk without teeth or carinae but sloping on each side of midline, with median, glabrous carina on apical half or more; clypeal midline in profile straight basally, shallowly concave apically; free margin of lobe rounded mesally and concave


laterally, corner well-dehined: distance between corners about 2.3 * distance between corner and orbit. Distance between hindocelfar scar and orbit about 0.9-1.1 x star length. Gena with two teeth; ventral (larger) tooth located at level of mantibular base (Fig. 92d). Flagellomere 1: dorsal length 1.4-1.6 $\times$ apical width. Pronotum: precollar with lateral, longitudinal carina, side deeply sulcate. Forecoxa concave along inner margin, somewhat prominent (and carinate) near foremargin anterolaterally. Forebasitarsus with 5 or 6 rake spines; length of apical spine about $1.1 \times$ apical width of basitarsus. Foretarsomere 1V: length of inner apical spine $0.3-0.4 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum II
setose throughout. Setae of pygidial plate inconspicuous except stout on apical third to quarter (Fig. 92e). Length $6.5-8.5 \mathrm{~mm}$. 8.- Mandible: inner margin obtusely dentate. Clypeus (Fig. 92f.g): lobe acutely pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about $1.1 \times$ scar length. Flagellomere I: dorsal length equal to apical width. Foretrochanterat noteh shonter than distance that separates it from trochanteral apex (Fig. 93a), its bottom setose (Fig. 93b). Forebasitarsus with 3 or 4 rake spines; longest spine equal to apical width of basitarsus. Mid- and hindbasitarsus without preapical spines. Inner claws of mid- and hindlegs smaller than outer

 volsella ( $\times 211$ )
claws. Pygidial plate sparsely setose. Sterna without depressions, minutely, closely punctate throughout: sternal setae short, uniform. Sternum VIII rounded or shallowly emarginate apically. Volsella: Fig. 92h. Length $5.0-6.5 \mathrm{~mm}$.

Geographic Distribution (Fig. 94).-Africa between $10^{\circ}$ and $26^{\circ}$ S: Namibia to Mozambique, Zimbabwe to Transvaal.

Records.-BOTSWANA Serowe (198, 14 8, CAS, 18. CNC: 18 , NHMW. 36 \&, 4 8. USNM: 28 \&. 33 f, ZMK).

MOZAMBIQUE: Save Rıver in Massangena District (18, SAM)
NAM1BtA. Grootfontein District: 30 km NE Grootfonten (2\&. CAS, MS). 40 km NE Grootfontem (2\&, MS). Karihib District: Amerb Farm 19 mm NW Karibib ( 1 8, BMNH), 15 km E Kanbib ( $18, \mathrm{MS}$ ), 62 km E Kanbib (28. MS) Kavango Gebied 19 km E Omega, $18^{\circ} 01^{\prime} \mathrm{S}, 22^{\circ} 26^{\prime} \mathrm{E}$ (I \&. SMNW). Rundu (29 JG Okahandja District Okahandja (2\&, AMG. 1 \&, I \&, BMNH), 17 km W Okahandja ( 4 8. CAS). Outjo District 31 km SE Kamanjab (19, 1 \%. CAS; 2 \% MS). Tsumeb District: 10 km SE Tsumeb (1 q. CAS). Windhoek District 36 km E Windhoek ( 1 \&, CAS).

SOLITH AFRICA. Transvaal: D'Nyala Nature Reserve. 2345'S. 27027'E (18.

 trechanter (. 213).

1 f. NCIP), Guernsey Farm 15 km E kilasene ( 18. PAM), 10 km SW Naboomspruil (1 3, FSCA), Pafurn in Kruger Natıonal Park, 22026'S, 31¹2'E (3 9. 2 \%, NCIP), Phalahoarwa (19, FSCA). Skukuza in Kruger Nahonal Park, 2459'S. $31^{\circ} 35^{\prime} \mathrm{E}(19.23 . \mathrm{NCIP})$. Thebazımbı in Ben Albert Nalure Reserve, $24^{\circ} 37^{\prime} \mathrm{S}$ $27^{\circ} 23^{\prime} \mathrm{E}$ (1 8, NCIP)

TANZAN1A Narnawala in Kilombero Disiret (] \&. LUW)
ZIMBABWE Charara 20 km ESE Kariba at $16^{\circ} 33^{\prime} \mathrm{S}, 28^{\circ} 58$ E (I 8, CAS). Kariba

 NHMZ), Rhodesdale ( 1 \&. SAM. hololype of mulchellus).

Gastrosericus punctatus sp. $n$.
(Figures 94-90)
Derivation of Name. - Punctatus, Latin masculine adjective, with reference to the thoracic sculpture.

Diagnosis. - Gastrosertcus punctutus is unusual in having short, nearly appressed body vestiture combined with a pointed tubercle-like elevation on the propleuron (unlike walthl and its relatıves, the elevation is entirely punctate). The combination of short vestiture and well-defined mesothoracic punctures (many are more than one diameter apart) is also unique. although other
species (e.g., uroughtoni) approach this condition. In the female, the forecoxal pit (Fig. 96a) is diagnostic, and a transverse carina on the clypeal disk (Fig. 95a, b) is similar to that of funereus (unlike funereus, the pronotal side is not sulcate in punctatus). In the male, the sternal punctation is distinctive: mesal punctures of sterna 111 and IV are several to many diameters apart. whereas the lateral punctures are nearly contiguous. The absence of the rake spines on the male forebasitarsus is shared only with some funereus and some swalci, and the presence of a welldefined subbasal tooth on the inner mandibular margin is another subsidiary recognition feature.

Description. - Mandible with notched posterior margin, abductor ridge absent. Labrum: free margin shallowly, broadly concave. Orbit equidistant from antennal socket and hindocellus in female, in male slightly closer to antennal socket than to hindocellus. Propleuron near hindmargin with tubercle-like elevation that is slightly rising posterad. Genal, mesothoracic, and propodeal punctures well-defined, interspaces shiny. Scutal flange evenly curved throughout. Marginal cell: length of costal margin $2.2-2.7 \times$ apical truncation. Recurrent veins interstitial above or (most specimens) confluent in a short petiole.

Vestiture short, nearly appressed, including setae adjacent to oral fossa; propodeal setae suberect between side and hindface; mesopleural setae not obscuring integument.

Head black, but mandible brown red (except apically); scapal venter translucent apically in female, yellow in male. Thorax black except the following are pale yellow: pronotal lobe, tegula anteriorly, and humeral plate anteriorly. Femora black, with pale yellow apical spot which is longer ventrally than dorsally (spot short on hindfemur). Gaster, tibiae, and tarsi sexually dimorphic (see below for details). Wings slightly infumate.
9.- Mandible (Fig. 95c): inner margin with subbasal tooth and cleft but without preapical tooth (subbasal tooth reduced on right mandible in single female from Accra). Clypeus (Fig. 95a, b): disk of middle section with transverse, mesally interrupted carina; free margin of lobe weakly sinuous, corner welldefined; distance between corners $2.2 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about equal to scar length. Gena simple. Flagellomere I: dorsal length $1.8 \times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa with well-defined pit (Fig. 96a). Forebasitarsus with 5 rake spines; length of apical spine $1.2 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine $0.5-0.7 \times$ apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally with glabrous, triangular area. Setae of pygidial plate thin, inconspicuous except stout on apical third. Length $6.5-7.1 \mathrm{~mm}$.

Gastral segments I-III red, remainder black. Tibiae black, yellow dorsally (except at apex), foretibia yellow on outer side. Tarsi dark brown.
6. - Mandible: inner margin with subbasal tooth. Clypeus (Fig. 95 d, e): free margin of lobe weakly arcuate, corner rounded; distance between corners $0.8 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $1.2 \times$ scar length. Flagellomere 1: dorsal length equal to apical width. Foretrochanteral notch about as long as distance that separates it from trochanteral apex; its bottom glabrous (Fig. 96b). Forebasitarsus with no rake spines. Dorsum of midbasitarsus without preapical spines, dorsum of hindbasitarsus at most with one such spine. Inner and outer claws of all tarsi equal in size.


Figure 97. Gastrosertcus mothey: a, female head frontally ( $\times 26$ ); b, female clypeus ( $\times 44$ ); c, female mandible ( $* 60$ ), d, female head laterally ( $\times 31$ ), e, male head frontally $(\times 31)$; f, male clypeus $(\times 63)$, volsella $(\times 232)$.

Pygidial plate setose. Sterna without mesal depressions, with fine but well-defined punctures (lateral punctures of sterna 111 and IV subcontiguous, mesal punctures several to many diameters apart); sternal setae short, evenly spaced (sparser than average in other species). Sternum V1ll rounded apically. Volsella: Fig. 95f. Length $5.5-6.0 \mathrm{~mm}$.

Gaster all black (Senegal) or tergum 1, or terga I and II, red; sterna varying from all black to almost red. Tibiae yellow, red-
dish brown ventrally (foretibia reddish on inner side). Tarsi yellow.

Geographic Distribution (Fig. 94). - Senegal to Ivory Coast and Togo.

[^7]


## Gastrosericus rothneyi Cameron

## (Figures 97-99)

Gastrosenctus Rothney Cameron, 1889.147, \&, incorrect onginal capitalization. Lectotype: 8. India: West Bengal: Barrackpore (OXFORD), designated by Pulawskı in Kirombern and Pulawskı. 1986:15, evamined. -Binghanı, 1897:210 (redescriptıon); Dalla Torre, 1897:695 (listed); Rothney, 1903104 (Bengat), 113 (habitat); Pulawski, 1975:318 (synonymy), Bohant and Menke, 1976:256 (hsted). Krombeın and Pulawskı. 1986:4 (lıfe history). 15 (redescription).
(iastrosentus Bughom Cameron, 1897:22. 5, incorrect onginal capıalızation Holotype: \&, Indıa: West Bengal: Barrackpore (OXFORD). examined Synonymized with Gastrosericus rothnev by Pulaushı. 1975:318.-Rothney, 1903 104 (Bengal), 113 (habitat): nol Tsunekı, 196.3.3 and Iwata and Yoshisawa, 1964389 (actually (Gastrosericus stamenss).
(iovernericus thalandtus Tsunek1, 1974:622, \&, Holotype: \&. Thalland: Sara Bun (Tadashı Tano coll.. Fukut), exammed Synonymued with Gastrosericus rothnely by Pulawsk $1 m$ Krombern and Pulawsk1, 1986:15. - Bohart and Menke. $1976 \cdot 629$ (1)sted).

Diagnosis. - The female of rothery has a unique combination ol two genal teeth (Fig, 97d) and a pygidial plate covered with stout setae (except basally). The clypeal lobe is similar as in flurathls: broadly emarginate on each side, with narrow mes-
al process (Fig. 97a, b); and the pronotal precollar has no lateral, longitudinal carina, although the side is sulcate (same in fluviathlis, neavel, and some vedda). The propodeal punctures are welldefined, another subsidiary recognition feature.

In the male, the setae are appressed on the vertex but erect adjacent to oral fossa (setal length about one midocellar diameter), and subsidiary recognition characters are: clypeal lobe acutely pointed, clypeus and gaster black, and propodeal hindface shiny, with well-defined punctures. The West African fluviatilis is similar, but in that species the setae, between the mandible and occipital carina, are nearly appressed and shorter than the midocellar diameter and the propodeal hindface is dull, punctatorugose.

Description. - Mandible: posterior margin notched, abductor ridge present (evanescent in some specimens). Labrum: free margin narrowly, conspicuously emarginate. Orbit in female about equidistant from antennal socket and hindocellar scar, in male slightly closer to antennal socket than to hindocellar scar. Propleuron simple. Mesothoracic and propodeal punctures well-
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defined. Scutal flange evenly curved throughout. Marginal cell: length of costal margin $4.0-6.0 \times$ apical truncation. Recurrent yeins interstitial above or confluent in a short petiole.

Setae short, appressed on scape, frons, vertex and thorax (excluding propodeum); erect adjacent to oral fossa (about $0.3 \times$ basal width of mandible); partly concealing mesopleural sculpture; longest propodeal setae semierect, equal to two midocellar diameters.

Head, thorax and gaster black, but the following are yellow: mandible (all black in some females), tegula anteriorly, pronotal lobe posteriorly, and male scape apically. Legs black and yellow (see below). Wings infumate.
9.-Mandible (Fig. 97c): inner margin with two small subbasal teeth separated by cleft, but without preapical tooth. Clypeus (Fig. 97a, b): disk without teeth or carinae; free margin of lobe markedly concave laterally, mesally with narrow, almost par-allel-sided projection (that is straight or emarginate apically), with small, sharp projection next to corner, the latter also toothlike (tooth and projection separated by narrow, angulate incision); distance between lobe corners about $2.5 \times$ distance between orbit and corner. Distance between hindocellar scar and orbit about $1.6-1.7 \times$ scar length. Gena with two teeth: behind mandibular base and at midheight near occipital carina (Fig. 97 d ). Flagellomere I: dorsal length $1.6 \times$ apical width. Pronotum: precollar not carinate laterally, side deeply sulcate. Forecoxa concave near midlength of inner margin, inner anterior comer obtusely prominent. Forebasitarsus with 6 or 7 rake spines; length ol apical spine equal to apical width of basitarsus. Foretarsomere IV: length of inner apical spine about $0.3 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum II pubescent throughout. Pygidial plate covered with stout setae that largely obscure integument (except basally). Length $7-8 \mathrm{~mm}$.

Legs black, but the following are yellow; fore- and midfemora apically (up to half length of forefemur), foretibia externally, and mid- and hindtibiae dorsally (but apex of all tibiae black); foretibia brown on inner side.
o.- Mandible: inner margin obtusely angulate. Clypeus (Fig. $97 \mathrm{e}, \mathrm{f}$ ): lobe sharply pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about $1.7 \times$ scar length. Flagellomere 1: dorsal length 1.4-1. $6 \times$ apical width. Foretrochanteral notch shallow, inconspicuous (Fig. 98a). Forebasitarsus with 3 or 4 rake spines: longest spine equal to apical width of basitarsus. Dorsum of mid- and hindbasitarsus without preapical spines. Claws variable (see below). Pygidial plate selose. Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum V1ll evenly rounded apically. Volsella: Fig. 97 g . Length $4.2-6.5 \mathrm{~mm}$.

Legs black, but the following are yellow: fore- and midfemora apicoventrally (up to $2 / 3$ length of forefentur), hindfemoral apex, foretibia (except black venter and brown inner face), mid- and hindtibiae except venter largely black mesally.

Geggraphic Variation. - Specimens from various geographic areas vary in the size of claws and in color of mandibles and the male tarsi, as described below.

India, Nepal, Sri Lanka. Female: inner claw of mid- and hindtarsus slightly smaller than outer claw (Fig. 98a): mandible black basally, reddish mesally, and brown apically. Male: inner claws of mid- and hindtarsi markedly smaller than outer claws (Fig.

98c): mandible black basally, then yellow, reddish, and brown apically: tarsomeres I and II yellow.

Thailand, Vietnam. Female: inner and outer claws equal in most specimens but inner claw smaller than outer claw in a female from Wang Saphung; mandible black basally, then yellow, reddish, and brown apically (all black in a female from Wang Saphung and single female from Hanoi). Male: inner claws of mid- and hindtarsus insignificantly smaller than outer claws (most specimens), but noticeably smaller in a specimen from Ko Samet Island and two males from Hanoi; mandible yellow basally and reddish apically in Thai specimens. yellow mesally in Vietnamese specimens; tarsi all black or dark brown.

Geographic Distribution (Fig. 99). - India, Nepal, Sri Lanka, Burma, Thailand, Vietnam. Probably widely distributed in Indochina, as suggested by specimens collected in Loei and Wang Saphung on the Mae Nam Lo River banks, an affluent of Mekong.

RECORDS.-BURMA Tammthan (19. ZMHU).
INDIA Tamil Nadu: Coimbatore (I \&, CAS, 1 of GRF), Nedungadu in Thanjavur ( = Tanjore) Distnct (2 \&, MCZ. UCD). West Bengal: Barrackpore (2 o. l of. OKFORD, lectotype and paralectotype of rothne'w, holotype of hinghamt). Chapra ( 6 \&. BMNH).

NEPAL: Adhabhar near Simra, 600 feel ( 1 \&. CAS, 2 \&, CNC).
SRI LANKA (USNM unless indicated otherwise): Anuradhapura District: Hunuwilagama (248,58;68,35. CAS; 18. NHMW; 38, UCD). Padaviya (108, 1 8). Colombo District Labugama Reservor Jungle (78, 2 \%). Jaffna District: Kilmochchı (2 s). Mannar District: Kondachehi, Ma Villu (4 8,8 8), 0.5 ms NE Kohmotte in Wilpattu Natıonal Park (19), Pali Aru 20 mı NE Mannar (18, Zool. Mus. Lund). Kandy District Hasalaka (1 8), 5 mm NW Mahyangana (1 8). Monaragala Districl: Angunakolapelessa (1 §), Tanamalwila (1 8). Polonnaruxa District: Pimbureltawa $13 \mathrm{mı}$ S Mannampıtıya (1 8). Trincomalee District: Amanvayal (18). Tnncomalee, China Bay Rıdge Bungalow (18, 3 8 $^{\circ}$ ). Ratnapura Districl: Gilımale, Induruwa Jungle (18). Vavuniya District. Parayanalankulam Imgation Canal $25 \mathrm{mı}$ NW Medawachchiya ( 18.1 \%, CAS, 48.28 ).

THAILAND: Kanchanaburi Kanchanahuri(1) ©, CAS), Lam Ta Pen River bank 5 km NW Lat Y'a (18. CAS) Loei Loe1 ( 38.8 3. CAS). Wang Saphung (218, 25 ó, CAS; 18 , RVH). Rayong Ban Phe (18. CAS), Ko Samet Island (28.78, CAS). Sara Buri. Sara Bun ( 18.1 b, Tadashı Tano coll.; 1 \%. USNM, holorype and paralypes of thalandinus).

VIETNAM: Hanol (I \&. 2 o. ZMAU).

## Gastrosericus sabulosus sp. n.

(Figures 99-101)
Derivation of Name. - Sabulosus, Latin masculine adjective meaning sandy or living on sand; with reference to this species' habitats.

Diagnosis. - Females of sabulosus, lepidus, and unicolor have a similar clypeus (Figs. 100a, b): lobe free margin not angulate or scarcely angulate laterally, subdivided into three arcuate porlions, of which the median one is the largest; and subsidiary recognition characters are: gena dentate (Fig. 100d), pronotal side sulcate. Unlike the other two species, the female of sabulosus has a row of basoventral spines on the apical tarsomeres (Fig. 101 a). In addition, the middle clypeal section is black, and the gaster is either all black or red basally and black apically. The middle clypeal section is yellow in lepidus and most unicolor, and the gaster is all red in lepidus and has red or yellow markings in most umcolor.

In the male, the setae are appressed on the vertex and adjacent to the oral fossa; the clypeus (except laterally) and the gaster are all black; the clypeal lobe is pointed mesally (Fig. 100f); the mandible has no abductor ridge, and the inner and outer claws of each pair are equal in size. Unlike fluviatiles and rothneyi,


Figure 100. Gastrosericus sahulosus: a, female head ( $\times 29$ ); b, female clypeus ( $\times 49$; c, lemale mandible ( $\times 63$ ); d, Temale head laterally ( $\cdot 47$ ), e, pygidial plate of female $(\times 117$ ); f, mate clypeus $(\times 86), \mathrm{g}$, volsella $(\times 249)$.
the propodeum is dull, impunctate, uniformly microsculptured; unlike modestus, the sternal setae are appressed; and unlike truncates sternum VIII is not emarginate.

Description.-Mandible with notched posterior margin, ab-
ductor ridge absent. Labrum: free margin broadly emarginate. Orbit equidistant from antennal socket and hindocellus in female, slightly closer to antennal socket than to hindocellus in male. Propleuron simple. Thorax finely sculptured, punctures

 (-474)
indiscernible. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 3.5-4.5 * apical truncation. Recurrent veins separate or interstitial above.

Vestiture appressed, including setae adjacent to oral fossa and those between propodeal side and hindface; obscuring mesopleural integument.
Head black, but mandible pale yellow (exeept apically), also clypeus next to orbit in a female from Senegal and single male from Pakistan. Thorax black, but pronotal lobe, tegula, and humeral plate pale yellow. Gaster black in most specimens but segment 1 red in a female from Nouakchott area, Mauritania, and segments I and II red in a female from Oued Tayart, Mauritania, and one from Richard Toll area, Senegal. Femora black, yellow apically (yellow spot largest on forefemur). Tibiae reddish brown, pale yellow dorsally (laterally on foretibia). Tarsi yellow, somewhat darkened distally in female. Wings hyaline.
Q. - Mandible (Fig. 100c): inner margin with basal tooth and widely rounded eleft, but with no preapieal tooth. Clypeus (Fig. 100a, b): disk raised and glabrous along midline (except on basal hall); free margin of lobe with ill-defined lateral comer, subdivided into three arcuate portions, of which the middle is the largest; distance between corners $2.8 \times$ distance between corner and orbit. Distance between hindocellar sear and orbit about $1.3 \times$ scar length. Gena with tooth between mandibular base and oceipital carina (Fig. 100d). Flagellomere I: dorsal length $1.3 \times$ apical width. Pronotum: precollar carinate laterally, side sulcate. Forecoxa concave anteriorly on inner half, foremargin raised on outer half. Forebasitarsus with 4 or 5 rake spines: length of apical spine $1.2 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine $0.4-0.5 \times$ apical width of tarsomere. Tarsomeres V with basoventral spines (Fig. I01a). Sternum 11 setose throughout, withoul glabrous, apical area.


Figure 102. Gastrosericus santius: a, clypeus of a female from Kenya ( $\times 66$ ) , b, clypeus of a female from Israel ( $\times 61$ ), c. femate mandible ( $\times 62$ ). d. male clypeus ( $\times 76$ ); e, volsella (×209)

Pygidial plate asetose except with few stout setae apically (Fig. 100 e ). Length $6.2-8.0 \mathrm{~mm}$.
o.-Mandible: inner margin without subbasal tooth. Clypeus (Fig. 100f): free margin of lobe pointed mesally, not angulate laterally, forming single curved line with rest of clypeal margin; middle section carinate anteriorly along midline, but carina evanescent in some specimens. Distance between hindocellar scar and orbit about $1.6 \times$ scar length. Flagellomere I: dorsal length $1.1-1.2 \times$ apical width. Foretrochanteral notch shallow, about as long as distance that separates it from trochanteral apex (Fig. 101b); notch bottom nearly all setose (Fig. 101c). Forebasitarsus with 1-3 rake spines; longest spine $0.7 \times$ apical width of basitarsus. Dorsum of mid- and hindbasitarsus without preapical spines. Inner claws as large as outer claws. Pygidial plate densely punctate and setose. Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII roundly truncate or emarginate apically. Volsella: Fig. 100 g . Length $5.2-6.6 \mathrm{~mm}$.

Geographic Distribution (Fig. 99).-Known from two widely distant areas: Mauritania and Senegal, and also Pakistan.

Records. - Hololype: 8, SENEGAL: 16 km N Fatıck, 25 Jul 1991, WJP (CAS). Paratypes: MAURITANIA: 16 km NE Nouakcholi, 3 Nov 1993, WJP (18, CAS); same locality, November 1993, F. Borgato ( 1 す, FB); 70 km SE Nouakchott, 28 Oct 1993, WJP (1 ठ, CAS); Oued Tayart 30 air km NW Alar, 25 Oct 1993, WJP (18, CAS).

PAKISTAN: Punjab Faisalabad (as Lyallpur), 29 June 1929, collector unknown (1 $8, \mathrm{BMNH}$ ). Sind: Kirthar Natınal Park (headquarters) 150 km NE Karachs, $25^{\circ} 10^{\circ}-26^{\circ} 05^{\prime} \mathrm{N}, 67^{\circ} 10^{\prime}-67^{\circ} 55^{\prime} \mathrm{E}, 27-28$ June 1989, WJP. Waseem Ahmad Khan. and Muhammed Aleem Khan (19, CAS).

SENEGAL: same dala as holotype (18. CAS); same data but AM (28. AAM); $25-35 \mathrm{~km}$ S Richard Toll, 10 Jul 1989. H van der Valk ( 2 8, CAS); same data but 19 Jul ( 18 , LUW), 8 Aug ( 18, CAS, 18,18, ZMA), 11 Aug (18. 18, ZMA), 13 Sep ( 1 of. LUW), and $20 \operatorname{Sep}(1$ s); Vélngara, 15 May 1983, J. W. Everts (1 8. LUW).

## Gastrosericus sanctus Pulawski

(Figures 102-104)
Gastrasertcus sanctus Pulawski in de Beaumonı. Bytunskı-Salz, and Pulawski, 1973:16, 9 , of. Hololype: \&, Israel: Jencho (H. Bytınskı-Salz coll., Tel Aviv), examined.-Bohart and Menke. 1975:250 (listed).

Diagnosis. - The female of sunctus is similar to moncel (see that species, p. 92). The male has a unique clypeus (Fig. 102d): lobe prominent, broad, with a sinuate or arcuate free margin and well-defined comers that are closer to orbit than to each other. The combination of short genal setae and fimbriate impressions on sterna 111 and IV is shared only with wroughtoni. but unlike the latter species the setae are appressed adjacent to the oral fossa.
DESCRIPTION. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin biarcuate or broadly, shallowly concave. Orbit closer to hindocellar scar than to an-


tennal socket. Propleuron near hindmargin with pubescent tubercle (tubercle evanescent in many males). Thorax microsculptured, without well-defined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 2.0-3.5 $\times$ apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed (including setae adjacent to oral fossa). almost totally concealing mesopleural sculpture.

Head and thorax black but the following are pale yellow: mandible (black apically), clypeus (black basomedially in some specimens), scape or at least scapal venter (also pedicel ventrally in most males), pronotal lobe posteriorly, tegula, and humeral plate. Gaster and legs: see below. Wings hyaline.
8.- Mandible (Fig. 102c): inner margin with subbasal tooth and cleft but without preapical tooth. Clypeus (Figs. 102a, b; 103a, b): free margin of lobe arcuate or slightly sinuate, corner well-defined; distance between corners $2.6-3.2 \times$ distance between corner and orbit; lip in many specimens slightly depressed apicomesally and/or free margin thickened laterally (Fig. 103a, b). with lateral tubercle in some specimens (see Variation below). Distance between hindocellar scar and orbit $0.5-0.6 \times$
scar length. Gena simple. Flagellomere I: dorsal length 1.5-1.75 $\times$ apical width. Pronotum: precollar carinate or not carinate laterally (see Variation), side indistinctly sulcate in some specimens. Forecoxa flat or scarcely concave anteromesally. Forebasitarsus with 6 rake spines, length of apical spine $1.8-2.0 \times$ apical width of basitarsus. Foretarsomere JV: length of inner apical spine 0.5-0.6 $\times$ apical width of tarsomere. Venter of tarsomere V with one or occasionally no or two basomedian spines and in most specimens with one spine on each lateral margin subbasally. Sternum II apicomesally with glabrous, triangular area. Pygidial plate covered with stout setae that conceal integument. Length $6.5-7.5 \mathrm{~mm}$.

Gaster red basally and dark apically in most specimens but largely black in female from Abd al Kuri Island and all black in female from Watamu Malindi, Kenya. Femora black or partly ferruginous, with yellow apicoventral spot (spot largest on foreleg), but spots almost totally reduced in female from Ein Gedi, Israel. Foretibia ferruginous, yellow on outer side (except all ferruginous in lsraeli female); mid- and hindtibia ferruginous, yellow dorsally (all brown in Israeli female). Tarsi ferruginous (mid- and hindtarsi brown in Israeli female).


Figure 104. Collecting locahties of Gustrosericus sunctus
f.- Mandible: inner margin without subbasal tooth. Clypeus (Fig. 102d): free margin of lobe arcuate or sinuate, with welldefined corners; distance between corners $2.0 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $0.6-0.8 \times$ scar length. Flagellomere I: dorsal length 1.1-1,25 $\times$ apical width. Foretrochanteral notch slightly shorter to longer than distance that separates it from trochanteral apex (Fig. 103c). Forebasitarsus with 3 or 4 rake spines; apical spine equal to 1.2-1.4 apical width of basitarsus. Dorsum of midbasitarsus with two or three preapical spines, dorsum of hindbasitarsus with one or two such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna I-IV mi-
nutely, closely punctate except sterna III and IV glabrous apıcally; sterna V and VI setose throughout or largely glabrous; sterna III and IV mesally depressed (as in Fig. 143b), depressions conspicuously fimbriate, fimbriae appressed, fully concealing integument, curving ventrad apically. Sternum III and IV depressed (except laterally), depressions densely fimbriate, fimbriae concealing integument. Volsella: Fig. 102e. Length 5.56.0 mm .

Gaster all red in some specimens (those from Burkina Faso, Ghana, Oman, Togo, and some from Mali, Pakistan, and Senegal), dark apically in most, largely to all black in those from Socotra; only part of segments I and II red in Israeli and some

Kenyan males. Femora black or ferrugınous, with large yellow, apicoventral spot, but spot almost totally reduced on mid- and hindfemora in Israeli and Socotran males. Foretibia light brown or ferruginous, yellow on outer side; mid- and hindtibiae brown or ferruginous. yellow on dorsum, but hindtibia all brown in lsraeli specimen. Foretarsus yellow or ferruginous, mid- and hindtarsi ferruginous (basitarsus yellow in some specimens), brown in Israeli specimen.

Variation. - Clypeal lip of female simple in most specimens, but with tubercle near each corner (Fig. 102b) in specimens from Israel, Yemen, and Socotra, and some from Burkina Faso. The pronotal precollar is carinate laterally in most females, but not carinate in specimens from Burkina Faso, Mali, and Senegal as well as the single specimens studied from Ghana, Tanzania, and Togo.

Geographic Distribution (Fig. 104). -Senegal and Ivory Coast to Tanzania, Kenya, Namibia (one record) and South Africa (one record): also Arabian Peninsula, Israel, and Pakistan.

Records.-BURKINA FASO: Bobo Dioulasso (18, JH), Gourma Kompienga 20 km S Pama ( 3 \& , CAS, 78,3 \&, LEN).

GHANA Kawampe, $8^{\circ} 30^{\prime} \mathrm{N}, 1^{\circ} 35^{\prime} \mathrm{W}, 45 \mathrm{~km} \mathrm{~N}$ Kintampo (18,98, CAS).
ISRAEL: En Gedı ( 18.18 . paratypes. CAS), Jencho (de Beaumont. ByunskiSal/, and Pulawski, 1973).

IVORY' COAST 40 km S Toumodı (18, CAS)
KENYA: Archer's Post on Evaso Ng'iro River (1 8. CAS), Lake Barıngo (1 8, USU'). Mombasa (18.2 8. CAS, 18.2 J. LUSU), Tsavo National Park 10 mi SE Kilagunı Lodge (1 8. CAS), W'atamu (Manne Park) cırca 1-15 km S Malındı (I 9, 6 f, AAM. 1 ㅇ, 2 8, CAS)
MALI 25 km N Bamako (18, CAS), 40 km W Douentza (1 8, CAS), Gao (2 8. KMG), 158 km SW Gao ( 18. CAS), 45 km W Moptı ( 38.38 , CAS), Mourdıah ( $18, \mathrm{BMNH}$ ), 30 km NE San ( $13, \mathrm{CAS}$ ), 100 km NE San ( 38, CAS), $5-7 \mathrm{~km} \mathrm{~S}$ San ( $18,28, \mathrm{CAS}$ ), 20 km SW San ( 18,18, CAS), $30 \mathrm{~km} \mathrm{~S} \mathrm{San} \mathrm{(18,CAS)}$, SE Ségou ( 18, CAS), 40 km W Ségou ( 18.2 3, CAS).

MAURITANIA Oued Tayart 30 aır km NW Atar (1 ô, CAS)
NAMIIBIA Grootfontein Distriet 30 km NE Grootfonlem (18, CAS, $18,1 \mathrm{~s}$, MS).

NIGER: Namey ( 18. LUW'), Takieta. $13^{\circ}+3^{\prime} \mathrm{N}, 8^{\circ} 31^{\prime} \mathrm{E}(1$ P, FSAG)
OMAN: Dhofar S-N road K 48 ( 1 \&. hMG). Oman Masırhah Island (2 3. KMG).
PAKISTAN: Baluchistan Hazargany Chiltan National Park 20 km SW' Quetta (1) \&. 5 8, CAS).

SAUIDI ARABIA. Abu Arish (1 \%, KMG), EI Rıad (2 f, CAS, WL).
SENEGAL. Bayakh 45 km W Dakar ( 18 , CAS), Dakar ( 2 9, FB), 5 km SE Diourbel ( 29,48 . AAM, 4 b, CAS), 16 km N Fatuck ( 6 8, AAM. 3 \& 16 8, CAS), Kaffrine ( 1 \&. CAS), Louga ( 1 8, ZMA), Ndangane 45 arr km SE Mbour (18, 10 \&, CAS. 18. FB). Richard Toll ( 1 s, CAS), 3 km NW Samba Dia $=70 \mathrm{arcm} \mathbf{~ W}$ Kaolack (29.5 5, AAM, 89,13 , CAS), Tambacounda ( 3 ㅇ.1 1 , AAM, 48, 2 \%, CAS), 5 km SW Thès ( 18.1 o, AAM, 19.95. (AS)
SOMALIA Mogadishu ( 1 s. AM).
SOLTTH AFRICA. Cape l'rovince Witsand Farm near Roanng Sands a1 $28^{\circ} 32^{\prime}$ 'S, 22030'E (18. PMA).

IANZANIA Bahary curca 25 km N Dar es Salam (I 9.53. AAM. 1 8. CAS)
TOGO: 8 km N Sotoboua ( 13 . CAS), $12 \mathrm{~km} S$ Sohodé (2 $\%$. CAS). 5 km W sokodé (I \& , CAS), 10 km N Wahala (18, CAS).
UNITED ARAB EMIRATES Khor Fakhan (1 f. CAS. 18.18. KMG).
IEMEN Abd al Kuri Island (1 9. BMNH), Hays (circa 50 km S Hudaydah harbor) ( 1 \&, 3 8. AAM1. 1 8, CAS), Socolra: Hadıbo Plan ( 58 , BMNH, 1 \%, CAS), Wadı Rima near Sanaa (1 \& CAS).

## Gastrosericus senegalensis Arnold

(Figure 105)
(iastrosermus senegalensis Arnold, 1951 158. \&. Holotype: \&. Senegal Dakar (BMNH), exammed - Bohart and Menke, 1976.256 (listed).

Diagnosis. - The female of semegulenses is characterized by the following: clypeal lobe well-defined, with an evenly arcuate
free margin and no discal tooth or carinae (as in Fig. 32a); scutal flange almost evenly curved throughout; gaster all red and hindfemur largely red. Some other species share these characteristics, but in senegalensis the elypeal disk has no glabrous. longitudinal swelling (swelling present in chalcithorax), the scapal venter is all black or narrowly yellow basally and translucent apically (all yellow in electus), and the outer apical spine of foretarsomere IV is equal to or longer than the apical width of the tarsomere (about 0.5 of apical width in karooensis).

In the male, the vestiture is appressed, the free margin of the clypeal lobe is roundly, obtusely arcuate and not angulate laterally (as in Fig. 32c), the foretrochanteral notch is deep (as in Fig. 33a), sternal setae are short, uniform, the scape and the tarsi are yellow, and the gaster is red, with no yellow markings. This combination is shared with other species, but senegalensis differs in having: flagellum black, dark brown ventrally (yellow at least ventrally in electus); hindfemur red and yellow (black and yellow in $a=y$ ); and foretarsal rake long; longest spine of forebasitarsus 1.2-1.7 $\times$ apical width of basitarsus (no longer than apical width in electus).
Status of the Species. - Gastrosericus senegalensis differs only minimally from electus and could be regarded as a variant of the latter. I consider it to be a full species because I have observed no intergradation, even in mixed populations (e.g.. 10 km E Mopti, Mali).

Description.-Mandible with notched posterior margin, abductor ridge absent, Labrum: free margin emarginate. Orbit closer to hindocellus than 10 antennal socket in female, equidistant in male. Propleuron simple. Thorax finely sculptured, scutal punctures barely discernible. Scutal flange almost evenly curved throughout. Marginal cell: length of costal margin 4.2$5.5 \times$ apical truncation. Recurrent veins interstitial above or conlluent in a short petiole.

Vestiture appressed including setae on propodeum and adjacent to oral fossa: mesopleural setae concealing integument.

Mandible yellow, black apically; clypeus all black or reddish anteromesally, with anteromedian yellow spot of varying size in some males; flagellum black, dark brown ventrally. Thorax black except pronotal lobe, tegula, and humeral plate pale yellow, Gaster red. Wings slightly infumate. Color of seapes and legs sexually dimorphic (see below).

ㅇ. - Mandible: inner margin with basal tooth and cleft, but without preapical tooth. Clypeus (as in Fig. 32a): disk without teeth or carinae; free margin of lobe arcuate; distance between corners 2.5-2.6 $\times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $1, I \times$ scar length. Gena simple. Flagellomere I: dorsal length about $2.0 \times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 (mosily) or 6 rake spines; length of apical spine $1.8-2.0 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine $1.0-1.5 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum II apicomesally with glabrous, triangular area. Pygidial plate with no to three appressed, preapical setae (mostly two). disk asetose or with a few inconspicuous, minute setae. Length $5.2-6.3 \mathrm{~mm}$.
Scape black except translucent apicoventrally, narrowly yellow basally in many specimens. Forefemur black, apically with large, yellow spot; midfemur black basally, red mesally, yellow



Fk, ire 100 (iustresermus shestahew male: a clypeus( * 75) b. marginal cell of torewing ( $\times 77$ ), c, volsella ( $~ 224$ ).
apically; hindfemur all red or black basally, with small yellow spot apically. Tibiae yellow, red ventrally (foretibia red on inner side). Tarsi red or forebasitarsus yellow.
f.-Mandible: inner margin without subbasal tooth. Clypeus (as in Fig. 32c): obtusely pointed, not angulate laterally, forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about $1.1 \times$ scar length. Flagellomere 1: dorsal length $1.0-1.3 \times$ apical width. Foretrochanteral notch longer than distance that separates it from trochanteral apex, its bottom varying from setose to glabrous. Forebasitarsus with 2-5 (mostly 3 ) rake spines: longest spine 1.2-1.7 $\times$ apical width of basitarsus. Dorsum of midbasitarsus with no, one, or two preapical spines, dorsum of hindbasitarsus with no or one such spine. Inner claws of all tarsi as large as outer claws. Pygidial plate densely setose. Sterna without depression. shortly, evenly pubescent. Sternum VIII rounded apically. Volsella as in electus (see Fig, 32e). Length $4.1-5.2 \mathrm{~mm}$.

Scape and pedicel yellow. Femora red or fore- and midfemora black basally, all femora yellow apically (yellow may extend ventrally nearly to femoral base). Foretibia yellow, reddish on inner side, mid- and hindtibiae all yellow or reddish ventrally (reddısh zone not reaching base or apex). Tarsi yellow.


Figure 107. Gastrosericus shestakov: male foretrochanter ( $\times 175$ ).

Life History. - 1 collected two females 10 km E Mopti, on 7 August 1991, that were carrying a young acridid nymph each. One nymph was determined as Acrotylus glaucopsis Walker, the other as Acrotylus sp. (Cantatopinae), by N. D. Jago. A female collected 20 km SW San, on 22 August 1991, was carrying a homopteran, a member of Dictyopharidae, Fulgoroidea (det. Lois B. O’Brien). Thus, senegalensis uses representatives of at least two insect orders as prey.
Geographic Distribution (Fig. 105).-Senegal. Mali, and Burkina Faso.

Records. - BURKiNA FASO Bobo Dioulasso (28. MNHN). Gourma Komplenga 20 km S Pama (18, LEA1).
MALI: Douentza ( 11 \&, 6 s, CAS, 22 \&. 20 8., MS), Gao ( 18,3 of, CAS: 18. KMG, $48,28, M S), 10 \mathrm{~km} \mathrm{~N}$ Gao ( $18,28, \mathrm{MS}$ ), 30 km W Gao (2q, MS). 158 km W Gao (18, CAS), Homborl (22 \&, 20 8, CAS, 478, 50 8, MS), 5 km E Hombon
 8, 4 है, CAS), 30 km NE Hombon (28, 20 है, MS), 10 km E Mopl ( 16 8. 23 है, CAS, 3 \&, 15 名, MS), 45 km W Moptı ( 48, CAS, 118,7 8, MS), 130 km NE Mopli

 40 km SW Ségou ( 6 f. CAS, 58,6 है, MS) , 70 km SE Ségou ( $18, \mathrm{CAS}$ ).

SENEGAL: Dakar (I \&, BNINH, holotype of senegalensis), 5 km SE Diourbel ( $68, \mathrm{CAS}$ ), 40 km ESE Louga ( 1 ㅇ, CAS), Ndangane 45 a1r km SE Mbour ( 29.7 d. CAS), 25-35 km Richard Toll ( 1 \&. ZMA), 3 km W Samba Dıa $=70 \mathrm{~km} \mathrm{~W}$ Kaolack (18. AAM1).

## Gastrosericus shestakovi Gussakovskij

(Figures 105-107)
Gastrosertcus shestakov Gussatovskis, 1931:454, है. Holotype: 8ै, Turkmenistan Uch-Adzhı (ZIN), evamined.-Bohar and Menke, 1976:256 (Irsted); Kazenas, 1978:137.

Diagnosis. - A short marginal cell (Fig. 105b) whose costal margin is about $1.1-1.2 \times$ apical truncation, combined with sinuous thoracic setae (propodeal setae as long as basal mandibular width or longer), is unique to Gastrosericus shestakovi.

Description (based on male only).-Mandible: posterior margin notched, abductor ridge absent. Labrum: frec margin deeply, roundly emarginate. Orbit closer to hindocellar scar than to antennal socket. Pronotum simple. Propleuron near hindmargin with shiny, triangular elevation that is slightly rising


Figure 108. Gastrosericus siamensh a, female clypcus $(\times 60$ ); b, female mandible ( $\times 62$ ); c, male clypeus $(\times 88$ ); d, male pygidım ( $\times 146$ ): e, volsella $(\times 308$ ), f, penis valve ( 154 ).
posterad. Scutum and mesopleuron with well-defined, almost contiguous punctures. Scutal flange slightly expanded adjacent to tegula, contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin 1.1-1.2 $\times$ apical truncation. Recurrent veins separate.

Setae sinuous on thorax and also adjacent to oral fossa, where they are equal to basal width of mandible or slightly longer; almost totally hiding mesopleural sculpture; sinuous, semierect on scapal venter and hindfemoral venter.

Head black, but mandible (except apically), clypeus and scape (except mesodorsally) pale yellow. Thorax black except pronotal lobe yellowish posteriorly. Wings hyaline. Gaster and legs varying in color. In Turkmen and Uzbek specimens, the gaster is ferruginous, the fore- and midfemora are black (except apically), the hindfemur is ferruginous; tibiae ferruginous, fore- and midtibiae pale yellow on outer side, hindtibia pale yellow dorsally;
foretarsus yellowish, mid- and hindtarsi ferruginous. In the Karachi specimen, the gaster is black, with apical depressions of segments translucent; all femora black except pale yellow apically; tibiae brown, pale yellow dorsally; tarsi yellowish.
¢. - Unknown.
ઠో.-Mandible: inner margin not dentate. Clypeus (Fig. 106a): lobe obtusely angulate mesally but not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about $0.9 \times$ scar length. Flagellomere I: dorsal length $1.75-2.0 \times$ apical width. Foretrochanteral notch about as long as distance that separates it from trochanteral apex (Fig. 107), its bottom covered with appressed setae (except glabrous basally). Forebasitarsus with 4 or 5 rake spines; longest spine $2.0 \times$ apical width of basitarsus. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna III and IV (except laterally) with fimbriate de-


Figure 109 Giastroserticus shamensls. malé loretrochanter ( - 234).
pressions, fimbriae appressed basally and fully concealing integument, curving ventrad apically; sterna V and VI with usual, straight setae that delimit apical depression, and with shorter, dense, erect setae. Sternum VIlI rounded apically. Volsella: Fig. 105 c . Length $5.2-6.5 \mathrm{~mm}$.

Geographic Distribution (Fig. 105).-Pakistan, Turkmenistan, Uzbekistan.

[^8]Gastrosericus siamensis Tsuneki
(Figures 105. 108. 109)
As Gastrosencus hinghamu: Tsuneki, 1963.3, and Iwata and Yoshskawa, 1964 389-390 (both citatons corrected to stamensts by Tsuneki, 1974 626).
Gastrosericus siamensts Tsunekı, 1974:626, \& Holotype: 3. Thalland Ayuttaya (Tadashı Tano coll., Fukuı), evammed - Bohart and Menke, $1976: 629$ (listed); Krombein and Pulawski, $1986: 5$ (revision).
Gastrosertcus menom Sudheendrakumar and Narendran, 1985:50. 8. Holotype: S. India: Kerala: Nilambur (CALJCUT), examined New synonym.

Diagnosis. - Gastrosericus siamensis is an Oriental species.
The female has an evenly arcuate clypeal lobe, with no diseal tooth or carina (Fig. 108a); the pygidial plate is asetose or has inconspicuous setae (no stout setae); and the gaster and femora are black (extreme apex of femora yellow). Several African species are similar, but siamensis differs as follows: scutal flange evenly curved throughout (as in Fig. 3a) whereas unevenly curved in simplex and sohrimus (as in Fig. 3b); foretarsomeres 11 and 111 slightly expanded apicolaterally (as in Fig. 115a), length of foretarsomere III equal to apical width (foretarsomeres not expanded in eurrpus, karooensis, and simplex. length of foretarsomere [11 1.2-1.3 $\times$ width). See these species for additional differences.

The male of stamensis has a well-delined clypeal lobe, with prominent corners and a rounded median projection (Fig. 108c), a black gaster and a straight midbasitarsus. The clypeus is simular in the male of tussa, in which the gaster is red basally and the midbasitarsus is characteristically bent (Fig. 126e). Addi-
tional recognition features of male siamensis are: pygidial plate sparsely punctate (Fig. 108d) in many specimens and sterna IIV asetose apically.

Description. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin arcuate. Orbit closer to hindocellar sear than to antennal socket in female, but equidistant or slightly closer to socket than to scar in male. Propleuron simple. Thorax finely punctured, scutal punctures well-defined, less than one diameter apart, interspaces shiny; mesopleural and propodeal punctures almost contiguous. Scutal flange evenly curved throughout. Propodeal dorsum of many specimens with median longitudinal carina. Marginal cell: length of costal margin 3.8-4.2 $\times$ apical truncation. Recurrent veins narrowly separate, interstitial above, or confluent in a very short petiole.

Vestiture appressed (setae semierect between propodeal side and hindface, about one midocellar diameter long), partly obscuring mesopleural integument: setae adjacent to oral fossa appressed in female, semierect in male (about half length of midocellar diameter).

Head black, mandible pale yellow except dark on apical third. Thorax black, pronotal lobe pale yellow. Gaster black. Femora black, except pale yellow apically. Tibiae pale yellow except foretibia brown on inner side and mid- and hindtibiae brown ventrally. Tarsi brown. Wings slightly infumate.

ㅇ.- Head elongate, distance between dorsal edge of antennal socket and ventral edge of midocellus $1.4 \times$ least interocular distance. Mandible (Fig. 108b): inner margin with subbasal tooth and cleft but without preapical tooth. Clypeus (Fig. 108a): disk without teeth or carinae, punctate to base of lip or with minute glabrous area apicomesally; free margin of lobe broadly arcuate, minimally convex mesally and concave laterally in many specimens, comer well-defined; distance between lobe corners 2.5 $\times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $1.1 \times$ scar length. Gena simple. Flagellomere I: dorsal length $1.7-2.0 \times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 or 6 rake spines; length of apical spine $1.0-1.1 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine about $1.2 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum II with glabrous area apically. Pygidial plate with a few punctures, asetose or with inconspicuous setae (with no stout setae apically). Length $4.5-8.0 \mathrm{~mm}$.
f. - Mandible: inner margin with conspicuous subbasal tooth. Clypeus (Fig. 108c): lobe well-defined, with free margin obtusely pointed mesally and corner prominent; distance between corners $0.8-1.2 \times$ distance between comer and orbit. Distance between hindocellar scar and orbit about $1.1 \times$ scar length. Flagellomere I: dorsal length about $1.25 \times$ apical width; setae of flagellar venter slightly longer than in other species. Foretrochanteral noteh shallow, shorter than distance that separates it from trochanteral apex (Fig. 109), its bottom with a few sparse, appressed setae. Forebasitarsus with 3-5 rake spines; longest spine equal to apical width of basitarsus. Inner claws of all tarsi as large as outer claws. Pygidial plate punctate, setose, punctation variable, punctures averaging less than to more than one diameter apart (Fig. 108d). Sterna without mesal depressions, sterna l-V minutely, elosely punctate except apical depressions impunctate; sterna VI and VII sparsely punctate; sterna I-V uniformly setose exeept apical depressions glabrous; setae of


Figure 110. Gastrosericus smplex: a, female head frontally ( $\times 42$ ), h, female clypeus ( $\times 73$ ) : c, female mandible ( $x 72$ ), d, female head from above $(x 44)$, e male head frontally ( $\times 41$ ), f, male clypeus ( $\times 82$ ); $g$, male head from above ( $\times 43$ ); h, mate tergum VII ( $* 68$ ).


Figure 111 (iustronsericus simpliz. a. volsella ( * 271), b, penis valve ( $\times 213$ )
sterna III-V slightly longer than basal setac of sternum Il. Sternum V1Il rounded apically. Volsella: Fig. 108e. Penis valve with a broadened apical portion: Fig. 108f. Length $4.5-6.0 \mathrm{~mm}$.

Life History. - Iwata and Yoshikawa (1964) studied the nesting behavior of siamensis in Thailand. I confirmed their observations of digging behavior and prey in April 1989 (Chaam, Lat Ya area. and Chiangmai), and I also noted the use of the foretarsal rake. When closing the nest, the female faces away from the nest, breaks the ground with her mandibles and the foretarsi, and projects the sand grains into the burrow with her foretarsal rake. The mandibles and foretarsal rake are also used for opening the nest when the female comes back with prey.

Geographic Distribution (Fig. 105). - South India to Nepal, Burma, and Thailand.

Records.-BURMA. Taninthari Yunzalın Valley ( 1 子, BMNH)
INDIA Kerala: Nilambur (holotype \& of menom, CALICUT, paratype \& of menom, CAS). Tamil Nadu Kankal (3q, CAS, FSAG, GRF).

NEPAL. Adhabhar near Simra (1 \&. CNC)
THAILAND Ayuthaya Ayulthaya (l s. Tadashı Tano coll., Fukuı, hololype

 nohh bottom ( - +2.)
of stamenses), Chiangmai Chiangmal (18,18, BMNH, 78, 16 8, CAS, 38, KOBE). Kanchanaburi Lam Ta Pen Rıver bank, 5 km NW Lat Ya ( 39 ㅇ, 11 各, CAS). Phetchaburi: Cha-am (39, CAS). Rayong: Koh Samet Island (18, CAS).

## Gastrosericus simplex Arnold

(Figures 110-113)
Gastrosencus simplex Arnold, 1922:119, 2, of. Lectotype: \&, Zimbabwe: Inyanga District. Wittington Estate (SAM), present designation, examined. - Bohart and Menke, 1976:256 (Isted).
Gastrosertcus deciptens Anold, 1955:759.8. ©. Holotype: \& Lesotho: Lenbe (SAM), examined. New synonym - Bohart and Menke, 1956:256 (listed).

Lectotype Selection. - Arnold mentioned a single type, with no further details, in his description of simplex, but he labeled a male (now headless) and a female, pinned on the same piece of eardboard, as lypes. I have selected the female as the lectotype of simplex.

Diagnosis. - The females of simplex and sobrimus have a welldefined clypeal lobe, with a broadly arcuate free margin and no discal teeth or carinae (Fig. 110a, b); the scutal flange is slightly convex along the tegula but contrastingly concave next to the scutal hindcorner (as in Fig. 3b): the setae of the pygidial plate are all inconspicuous or absent; and the gaster and femora are black (extreme apex of femora reddish). In simplex. however. the mesopleural punctures are well-defined and not concealed by vestiture (somewhat ill-defined, largely concealed in sobrinus): the forctarsomeres 1 and II are not expanded apicolaterally (somewhat expanded, Fig. 115 a); length of foretarsomere 111 is about $1.3 \times$ apical width (equal to apical width); and sternum III is densely punctate cxcept with a few sparse punctures basomedially (sparsely punctate except laterally).

In the male, the free margin of the clypeal lobe is arcuate, angulate laterally (Fig. 110a, b), the gaster is black, and the seutal flange is as in the female (see Fig. 3b). Gastrosericus curvpus is similar, but in simplex the foretrochanteral noteh is shallow, not clearly delimited apically (Fig. 111a), without a row of dense setae (Fig. 111 b ), and hindtarsomere III is narrow (length 1.8 x apical width). In eurrpus, the forefemoral notch is deep, with a row of erect cilia, not extending to the trochanteral apex (Fig.


39d, e), and hindtarsomere 111 is broad (length $1.3 \times$ apical width). The sparsely setose pygidial plate of simplex (Fig. 110h) is a subsidiary diagnostic character.

Description. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin arcuate or (male) insignificantly emarginate. Orbit closer to hindocellar scar than to antennal socket. Gena thick in dorsal view (Fig. 110d, g). Propleuron simple. Thorax with well-defined punctures on scutum. mesopleuron. mesothoracic venter, and propodeal side. Scutal flange somewhat expanded along tegula and contrastingly concave between expansion and scutal hindcorner (as in Fig. 3b). Propodeal dorsum with longitudinal carina. Marginal cell: length
of costal margin 4.0-5.1 $\times$ apical truncation. Recurrent veins separate, interstitial above, or confluent in short petiole.

Vestiture appressed, including setae adjacent to oral fossa; not obscuring mesopleural integument in female and most males, but partly obscuring in some males from Zimbabwe; propodeal setae almost appressed between side and hindface.

Head, thorax, gaster, and femora black, but mandible (except apically) and pronotal lobe of most specimens pale yellow; female flagellum all black or brown ventrally; male flagellum reddish brown or yellowish brown ventrally. Foretibia all yellow to ferruginous, or brown to ferruginous on inner side and yellowish on outer side; mid- and hindtibiae brown to ferruginous,
with yellow dorsum (midtibia all brown except narrowly yellow basally in female from Pretoria). Foretarsus yellow or ferruginous, mid- and hindtarsi brown or ferruginous. Wings nearly hyaline.
9.-Head elongate (Fig. 110 a ), distance between dorsal edge of antennal socket and ventral edge of midocellus $1.4-1.6 \times$ least interocular distance. Mandible (Fig. 110 c ): inner margin with one subbasal tooth and eleft but no preapical tooth. Clypeus (Fig. 110a, b): disk without teeth or carinae, shiny and impunctate along free margin of lobe: shiny area broadened mesally , attaining frontoclypeal suture in some specimens; free margin of lobe arcuate, corner well-defined; distance between corners $2.6-2.7 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $0.6-0.7 \times$ sear length. Gena simple. Flagellomere 1: dorsal length 1.5-1.6 $\times$ apical width. Pronotum: precollar not earinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 or 6 rake spines; length of apical spine 1.2-1.3× apical width of basitarsus. Foretarsomere 1 V : length of inner apical spine about $1.25 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum Il narrowly glabrous apicomesally. Pygidial plate with fine, ineonspicuous setae (apical setae not thickened). Length $5.0-$ 6.0 mm .
of. - Mandible: ınner margın with conspicuous subbasal tooth. Clypeus (Fig. I10e, 1): lobe well-defined, with areuate free margin and sharply delimited comer: distance between corners 1.2$1.3 \times$ distance between comer and orbit. Distance between hindocellar scar and orbit about $0.9 \times$ scar length. Flagellomere 1: dorsal length about $1.2 \times$ apical width. Foretrochanteral notch broad, shallow, not clearly delimited distally (Fig. IIIa), its surface with moderately sparse setae (Fig. 111 b). Forebasitarsus with 4 or 5 rake spines; longest spine $1.0-1.3 \times$ apical width of basitarsus. Dorsum of mid- and hindbasitarsus without preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate sparsely punctate and setose, at least mesally (Fig. 111 h ). Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum V111 rounded apically. Volsella: Fig. 112 a , penis valve thickened apically (Fig. 112 b ). Length $4.0-6.1 \mathrm{~mm}$.

Geographic Distribution (Fig. 113).-Southern Africa north to Namibia, Botswana, and Zimbabwe.

RECORDS - BOTSWANA Serowe (1 \&. ZNIK).
LESOTHO Leribe (1 \&. SAM. holotype of dectptens), Mamathes (5 \%. 11 ह. AMG. |8,2 \&, CAS, 1 \&, SAM1, allolype of deciptens).

NAMIB1A. Ohahandja District Okahandja (1 ? BNINH). Tsumeb District Onguma Farm 55 mm NW Tsumeb (2 \&. BNNH).

SOLTH AFRICA Orange Free State: Hartismath (1 ₹. BMNH). Transvaal Barberton (1\&. NCIP). Discovery near Johannesburg (1 \& AM1(i), Ellisras (18. I *. AMG). Nogol Nalure Reserve, $23^{\circ} 58^{\prime} \mathrm{S}, 27^{\circ} 45^{\prime} \mathrm{E}(1 \mathrm{o}, \mathrm{CAS}, 1 \mathrm{z}, 2$ s. NCIP), Nooketsi (18. 1 ~, LISNM), D'Nyala Nature Reserve, $23^{\circ} 45^{\circ} \mathrm{S}, 27^{\circ} 27^{\prime} \mathrm{E}(1 \mathrm{~b}, \mathrm{NCIP})$.


ZIA1BABWE Chipinga Disinci: no specific localıy ( \& , LCD), Clarke's Farm on Khams River ( 1 S. I \&, FSAG). Inyanga Distnct. Wittingion Estate (1 \& 3 headless d, SAN1, lectolype and paralectotypes of stmple'd), Khanm (Arnold, 1922), ITngufa River (1 $\ddagger . S A M)$.

Gastrosericus sobrinus sp.n.
(Figures 113-115)
Derivation of Name. - Sohymus is a Latin word meaning cousin on the mother's side; a noun in apposition to the generic
name, referring to the probable close relationship between this species, siamensis, and simplex.

Diagnosis. - The female of sobrimus (an African species) has a well-delined clypeal lobe, with a broadly arcuate free margin and no diseal teeth or carinae (Fig. 110a, b); the scutal flange is slightly convex along the tegula but contrastingly concave next to the scutai hindcorner (as in Fig. 3b); the setae of the pygidial plate are all inconspicuous or absent; and the gaster and femora are black (extreme apex of femora reddish). Unlike other such species, the foretarsomeres 1 and 11 are slightly expanded apicolaterally (Fig. 115a), and length of foretarsomere 11I equals its apical width. Gastrosericus siamensis (an Oriental species) has a similar foretarsus, but the scutal flange is evenly curved.

The male of sohrimus has a well-defined clypeal lobe whose free margin is arcuate, angulate laterally (Fig. 114d, e), and the gaster is black. Gastrosericus eurypus and simplex are similar, but in sohrinus the mesopleural punctures are ill-defined, concealed by vestiture; the scutal flange is slightly expanded near the tegular midlength and concave between the expansion and scutal hindcorner (as in Fig. 3b): the foretrochanteral notch is deep and unusually wide (Fig. 115b, c): and the length of hindtarsomere $1 I$ is about $2.0 \times$ its apical width. In contrast, simple. has the mesopleural punctures well-defined and not concealed by setae and the foretrochanteral noth is flat, almost reaching the trochanter"s apex (Fig. 1I1). In ewrypus, the scutal flange is evenly curved throughout; the trochanteral notch is compressed and the length of hindtarsomere III is about $1.3 \times$ its apical width.

Description. - Mandible: posterior margin notched, abductor ridge absent. Labrum: Free margin broadly, shallowly emarginate. Orbit closer to hindocellus than to antennal socket. Propleuron simple. Thorax finely sculptured, but punctures welldefined on scutum. Scutal flange slightly expanded along tegula and contrastingly concave between expansion and scutal hindmargin. Marginal cell: length of costal margin $3.5-4.5 \times$ apical truncation. Recurrent veins separate, interstitial above, or confluent in a short petiole.

Vestiture appressed, including setae adjacent to oral fossa; propodeal setae nearly appressed between side and hindface; mesopleural setae almost completely obscuring integument.

Head and thorax black, but the following are pale yellow: mandible (except apically). scapal venter all or partly in males from Senegal and Mali, pronotal lobe, tegula, and humeral plate. Gaster black. Femora, tibiae, and tarsi: see below. Wings somewhat infumate in female. almost hyaline in male.

ㅇ. - Head elongate (Fig. I1 ta) distance between dorsal edge of antennal socket and ventral edge of midocellus $1.4-1.5 \times$ least interocular distance. Mandible (Fig. II fc): inner margin with basal tooth and cleft but without preapical tooth. Clypeus (Fig. 11 子a, b): disk without teeth or carinae; free margin of lobe weakly, evenly arcuate, corner well-defined; distance between comers $2.6-2.8 \times$ distance between corner and orbit: small, apicomedian area glabrous in many specimens from Namibia. Distance between hindocellar scar and orbit about $0.7 \times$ scar length. Gena simple. Flagellomere I: dorsal length 1.9-2.0 $\times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 or 6 rake spines: length of apical spine $0.8-1.0 \times$ apical width of basitarsus; foretarsomeres I and II somewhat expanded apicolaterally (Fig. 115a), length of foretarsomere 111 about equal to apical width. Foretar-

 volsella ( $\times 215$ ).
somere IV: length of inner apical spine 0.9-1.0 $\times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum II setose throughout, but setae finer and sparser on apical depression than on remaining surface. Pygidial plate asetose or with sparse, inconspicuous setae (setae absent apically). Length 5.5-6.8 mm.

Femora black except forefemoral apex narrowly yellow; also midfemoral apex minimally yellow in some specimens. Foretibia reddish, pale yellow on outer side: mid- and hindtibiae black (midtibia red in some specimens), with pale yellow dorsal
strip that in most specimens does not reach tibial apex. Foretarsus brown, mid- and hindtarsi black.
8. - Mandible: inner margin with subbasal tooth. Clypeus (Fig. $114 \mathrm{~d}, \mathrm{e}$ ): lobe well-defined, with arcuate free margin and sharply delimited corner; distance between corners 2.0-2.1 $\times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $1.1-1.2 \times$ scar length. Flagellomere I: dorsal length $1.0-1.2 \times$ apical width. Foretrochanteral notch deep, longer than distance that separates it from trochanteral apex (Fig. 115 b), its bottom unusually wide (Fig. 115 c ). Forebasitar-

 iotcouchamteral moteh of male in protile ( 261 ). c. same. notch bottom ( 300 )
sus with 2-4 rake spines; longest spine $0.6-1.0 \times$ apical width of basitarsus. Dorsum of mid- and hindbasitarsus without preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate or punctures sparse mesally (up to two diameters apart), finely setose. Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII rounded apically. Volsella: Fig. 114f. Length $4.5-6.2 \mathrm{~mm}$.

Forefemur black or brown dorsally, venter all yellow or black up to basal half; midfemur black except venter yellow (at least on apical half or third); hindfemur black except narrowly yellow al apex. Foretibia reddish, pale yellow on outer side; mid- and hindtibiae black, pale yellow dorsally and apically (black replaced with red on midibia in most specimens). Tarsi yellow.

Geggraphic Distribution (Fig. 113).-Senegal and Mali io Ghana, Gabon and Central African Republic to northern border of Namibia.

Records. - Holotype 9 , SENEGAL Ndangane, 45 air km SE Mbour, 26 Jul 1991. WJP (CAS), Paratypes: BURKINA FASO: Bobo Dıoulasso, 26 and 27 Sep 1979. AP (28, 1 8, CAS, 18,2 8, FSAG); Gourma Komplenga 20 km S Pama 1-16 Jun 1988, Sanborne, Landry, and Tou (48, CAS, 98, LEN1). Volta Norre 5 km E Boromo, 18 Oct 1979, AP ( 1 f. FSAG); Volia Rouge 15 km W Kokholigo, 22 Oct 1979, AP (I \&, FSAG)

CAMEROON: Victoria: Muyuka, $4^{\circ} 17^{\prime} \mathrm{N}, 9^{\circ} 25^{\prime} \mathrm{E}, 24-29$ June 1949, B. Malkin (18, CAS).

CENTRAL AFRICAN REPUBLIC Kiembe, $4^{\circ} 29^{\prime} \mathrm{N}, 21^{\circ} 53^{\prime} \mathrm{E}, 15 \mathrm{Jul} 1985, \mathrm{H}$ Dollfuss (1 \& CAS)

GABON Bıssobinam, $0^{\circ} 42^{\prime} \mathrm{N}, 9^{\circ} 39^{\prime} \mathrm{E}, 3$ Nov 1985, AP (18, FSAG); Owendo, coastal dunes, 8 Dec 1985, AP ( 3 3. CAS, 18,5 8, FSAG); Nzogbour, 17 Feb 1985, AP (28, CAS, FSAG): Tchibanga in Nyanga Province, 28 and 29 Mar 1986, AP (18, 1 \&, CAS, 1 \&, 1 \&, FSAG),

GHANA. Accra, Dec 1940, K. M Guchard (18, BMNH)
IVORI COAST: Katrola, 8 May 1981, J W Everts (! \&, LUW)
LIBERIA Kolobanu ( 2 3. MRAC. determined as Gastrasericus simplex by G Arnold).

MALI 25 km NW Bamako, 23 Aug 1991, MS (2g, MS) and WJP (1 f. CAS) 5 km S San, 3 Aug 1991, MS ( $18 . \mathrm{MS}$ ) , 30 km S San. 5 Aug 1991, WJP (18, 1 o., CAS): 50 km S San. 4 Aug 1991, MS (18, MS) and WIP (1 8, CAS).

NAMIBIA Kavango Gebied Rundu, 1993: MS, 23 Jan (28, MS), 31 Jan (289. CAS, MS), JG, 18 Jan ( 1 q, JG), 20 Jan ( 1 d, CAS), 31 Jan ( 2 \&, CAS, $28, J G$ ).

NIGERIA lbadan. 9 Nov 1913. W. A Lamborn (18, BANH); lle-Ife, $7^{\circ} 28^{\prime} \mathrm{N}$, $4^{\circ} 34^{\prime}$ E, May 1973, J. T. Medler (1 \&. AEI)

SENEGAL: Ndangane, 45 aırm SE Mbour. 11 Jul 1991, AM ( 18, AAM); same locality, 26 Jul 1991 , WJP ( 28,18, CAS) 3 km SW Samba Dıa $=70$ aır km W Kaolack, 9 Jul 1991, AM (1 \&, 1 o, AAM), W1P (2 8, 128 , CAS); same localıty, 10 Jul 1991, AM (1 8, AAM); same locality, 17 Jul 1991, AM (5 8, AAM), WJP (48, 3 5, CAS).

TOGO: Sokodé, Dec 1982, AP (29, CAS, FSAG).

## Gastrosericus swalei Turner

(Figures 71, 116, 117)
Gastrosencus swalet Tumer, 1916:258, \& Holotype: \&, Zimbabwe: Lonely Mine (BMNH), exammed. - Arnold, 1922.123 (ongmal description copted), Bohart and Merke, 1976:256 (listed), 260 (illustration of femate mandible).

Diagnosis. - The female of swalei has a unique clypeus and mandible: the clypeal lobe is unusually broad, with corner close to orbit (distance between comers some 11-13× distance between corner and orbit), the clypeal disk has a pair of shiny, obtuse leeth (Fig, 116a-c), and the inner mandibular margin is not dentate but deeply emarginate subbasally (Fig. 116d). In addition, the condylar ridge is obtusely angulate apically (Fig. 116 e ), and the propleuron is expanded into a winglike, prominent process (Fig. 116h, i), two characters shared only with madecassus and zoyphion (a similar but much smaller process is found in synander and occasional funereus).


Figure 116. Gastrosericus swaler: a, clypeus of femate from Tanzania ( $* 54$, b, clypeus of lemale from Botswana ( * 45), c, clypeus of Tan anan female in profile $(\times 88)$. d, female mandible, frontal view ( $\times 62$ ), e, femate mandible, outer surface ( 61 ), female head laterally ( $\times 39$, 0 ): $g$. outhine of gena showng reduced genal
 $216)$.

The male of swalei has a narrow, indistinctly tridentate clypeal lobe (Fig. 116k) whose corners are rounded, eloser to each other than to orbit; the scutal flange is straight or slightly convex along the tegula but contrastingly concave near the seutal hindcorner; the elypeus and gaster are all black; and the setae are long on sterna III-V (markedly longer than those on sternum 11). In madecassus, the clypeus and scutal margin as well as the sternal
setae are similar, but the clypeus is yellow and the gaster is red basally. Males of swalei and synander are identical externally and differ only in the shape of the volsella (compare Figs. 116(1) and 118 h ). The two species are largely allopatric: swalei ranges from Senegal to Transvaal, whereas synander is known only from Senegal and Mali. Both have been found in Tambacounda, Senegal, although at different times.


Figure 117. (iastrosericus smate: a, male foretrochanter ( $\times 237$ ), b, same: bottom of noth $(\times 476)$.

Description. - Mandible: posterior margin notched in male, stepped in female in which apex of condylar ridge is obtusely angulate (Fig. 116 e ); abductor ridge absent. Labrum: free margin biarcuate or emarginate except evenly arcuate in females from Mali. Orbit closer to hindocellar scar than to antennal socket in female, equidistant in male. Thorax finely sculptured, punctures well-defined on scutum, somewhat ill-defined on mesopleuron. Propleuron without tubercles or conical elevations near hindmargin, modified in female (see below). Scutal flange evenly arcuate or minimally expanded along tegula, contrastingly concave between expansion and scutal hindcomer. Marginal cell: length of costal margin 3.2-4.3 * apical truncation. Recurrent vems narrowly separate, interstitial above, or confluent in a short petiole.

Vestiture short, appressed (including setae adjacent to oral fossa); nearly appressed between propodeal side and hindface; partly obscuring mesopleural integument.

Head and thorax black, but mandible fexcept apex and in some specimens also base) yellowish red and the following are pale ycllow: pronotal lobe (at least posteriorly), tegula anteriorly, and humeral plate (also scapal apex in many specimens). Gaster black, terga I-V translucent apically (also tergum V1 in malc). Femora black, pale yellow apically (yellow spots longer ventrally than dorsally). Tibiae brown or ferruginous, pale yellow on outer side (foretibia) or dorsum (mid- and hindtibiae). Tarsi brown or ferruginous. or yellow basally, or all yellow. Wings almost hyaline.
8.-Mandible (Fig. 116d, e): inner margin without teeth, broadly emarginate subbasally. Clypeus (Fig. 116a-c): disk with a pair of shiny, obtuse teeth that are inconspicuous in the female from Bulawayo; free margin of lobe variously shaped (see Variation below); corner angulate, close to orbit. Distance between hindocellar scar and orbit about equal to scar length. Gena with tooth adjacent to occipital area, about one-third height from mandible to occiput (Fig. 116f, g), but tooth inconspicuous in some individuals. Flagellomere I: dorsal length $1.5-1.7 \times$ apical width. Pronotum: precollar with longitudinal carina on each sude: side sulcate, sinking posterad externally to longitudinal
carina; collar obtusely angulate anterolaterally except in smallest specimens. Propleuron with large, flat expansion posterolaterally (Fig. $116 \mathrm{~h}, \mathrm{i}$ ); expansion curved anterad, as long as $0.3-0.5$ $\times$ least interorbital distance. Forecoxa simple. Forebasitarsus with $4-6$ rake spines; length of apical spine $1.3-1.6 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine $0.4-0.5 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum Il punctate throughout or with glabrous apical area on each side of midline. Setae of pygidial plate inconspicuous except stout on apical fourth (Fig. 116j). Length $4.8-7.0 \mathrm{~mm}$.
d. - Mandible: inner margin without subbasal tooth. Clypeus (Fig. 116k): Iobe obtusely tridentate (median tooth larger than lateral teeth), indistinctly angulate laterally; distance between cormers $1.0-1.1 \times$ distance between corner and orbit: disk with two minute tubercles in specimen from Sawmills. Distance between orbit and hindocellar scar about equal to scar length. Flagellomere l: dorsal length $1.25 \times$ apical width. Foretrochanteral notch about as long as distance that separates it from trochanteral apex (Fig. 117a), its bottom glabrous (Fig. 117b). Forebasitarsus with $0-4$ rake spines: longest spine equal to apical width of basitarsus or shorter; dorsum of mid- and hindbasitarsus without preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna without median depressions, minutely, closely punctate throughout; setae Ionger on sterna III-V than on sternum II but not concealing integument. Apex of sternum VIll roundly truncate or emarginate. Volsella: Fig. $116(1)$. Length $4.2-6.5 \mathrm{~mm}$.

VARIATION. - Females vary markedly in the structure of the clypeus, and the variation seems to be partly individual and partly geographic. In specimens from Botswana and Transvaal, the clypeal surface is almost flat, with the two carinae markedly divergent dorsad, and the free margin of the lobe is almost straight. In females from Kenya (Archer`s Post). Tanzania, and in some from Zimbabwe, the clypeal surface is markedly raised mesally, the two carinae are almost parallel, and the free margin of the clypeal lobe is roundly projecting mesally. The single Temale from Tsavo, Kenya, is similar, but the free margin is

 obliquely from the side, specimen from Malı ( $~ 98$ ), e, female mandible ( $=82$ ), f, male head ( * 49); g, mate clypeus ( $\times 81$ ), h, solsella ( $\times 263$ ).
straight. In the specimen from Lonely Mine, Zimbabwe (the holotype), the clypeal surface is convex, the carinae are divergent, and the free margin is slightly emarginate mesally. Finally, in the females from Cameroon, Burkina Faso, Mali, and Senegal, the clypeal disk is convex, the carinae are diverging, and the free margin is nearly straight to roundly projecting mesally, entire or narrowly emarginate.

Geographic Distribution (Fig. 71).-Tropical Africa beiween Senegal and Transvaal.

## Records. - BOTSWANA: Serowe (2 2. CAS, ZMK).

BURKINA FASO: Boromo (1 $\%, 18$, CAS), 5 km E Boromo at Volita Norre shore (18, FSAG).

CAMEROON: 10 km W Maroua, $10^{\circ} 31^{\prime} \mathrm{N}, 14^{\circ} 14^{\prime} \mathrm{E}(18, F S A G)$ )
KENY'A. Archer"s Post on Evaso Ng`iro River (1 i, 1 \&, CAS), Tsavo Nalıonal Park, point 43 (about midway between Tanzanıan border S of Park and Kılaguni Lodge) (1 \&, 1 8, AAM, 1 \%. CAS).
MALI. 25 km N Bamako ( 38,95, CAS, 25, MS), 30 km N Bamako ( 68.3 s, CAS; 1 \&, MS), 130 km NE Mopu (1 8, MS), 30 km NE San (2 $5, \mathrm{CAS}), 60 \mathrm{~km}$ NE San ( $18, \mathrm{MS}$ ) 100 km NE $\operatorname{San}(28, \mathrm{CAS}), 5 \mathrm{~km} \mathrm{~S} \mathrm{San} \mathrm{(28}, \mathrm{CAS:} \mathrm{29} 38.$, MS), 20 km W San ( 1 日, CAS), 70 km SE Ségou ( 2,8, CAS, $13, \mathrm{MS}$ ), 40 km SW Ségou ( 18,2 8. CAS; 4 q. 1 8, MIS).

SENEGAL: Tambacounda ( $1 \mathrm{~F}, \mathrm{FSAG}$ ).
SOUTH AFRICA. Transvaal: D'Nyala Nature Reserve, $23^{\circ} 45^{\circ} \mathrm{S}, 27^{\circ} 27^{\prime} \mathrm{E}$ (1 3. NCIP), Mogol Nature Reserve, $23^{\circ} 58^{\prime} \mathrm{S}, 27^{\circ} 45^{\circ} \mathrm{E}(18 . \mathrm{CAS}, 18, \mathrm{NCIP})$. Pafurn in Kruger National Park, 22026'S. $31^{\circ} 12^{\prime} E$ (28. NCIP).

TANZANIA: Tarangırt Natıonal Park (18, CAS).
ZIMBABWE: Bulawayo(18, 1 s, BMNH, 1 g, UCD), Lonely Mme (18, BMNH,


Figure 119. Gastrosentws swander femate propleura and lorecoxae, ventral vicu ( $\times 71$ )
holotype of swalen). Khamı River 7 km WSW Nyamandhlovat $10^{\circ} 53^{\prime} \mathrm{S}$. $28^{\circ} 13^{\circ} \mathrm{E}$ (2 \& , 1 \& , CAS), 10 km E Mbalabala ( 1 \&, CAS). 11 km NE Nyamandhlovu at $19^{\circ} 48^{\prime} \mathrm{S}, 28^{\circ} 16^{\prime} \mathrm{E}(2$ ? , CAS, 28. NHMZ), Sawmills ( $18, \mathrm{BMNH}, 2$ 5, CAS, SAM).

## Gastrosericus synander sp. n.

(Figures 71, 118. 119)
Derivation of Name. - Symander is newly coined from two Greek words: syn-, with, together; and ander, man, male. An allusion to the male sex of this species, which is externally indiscernible from that of swalei.

Diagnosis.-The female of symander has a distinctive propleuron that is roundly expanded posterolaterally (Fig. 119), and the expansion is markedly smaller than in madecassus. swalel, or zorphion (compare Figs. 69g; 70a). Some funcreus also have a posterolaterally expanded propleuron, but such specmens have a red gaster, whereas the gaster is all black in symander.

The males of symander and swalel are identical externally but can be identified by their volsellae (compare Figs. $116(1)$ and 118h). See swalel (p. 132) for additional in formation.

Description. - Mandible with notched posterior margin, abductor ridge absent, Labrum: free margin emarginate mesally. Orbit closer to hindocellus than to antennal socket in female, equidistant in male. Propleuron without tubercles or conical elevations near hindmargin, modified in female (see below). Thorax finely punctate, but individual punctures well-defined on scutum. Scutal flange evenly curved or slightly expanded along tegula and contrastingly concave between expansion and seutal hindcorner. Marginal cell: length of costal margin 4.0$4.5 \times$ apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed, including setae adjacent to oral fossa; nearly so between propodeal side and hindface; partly obscuring mesopleural integument.

Head black, but base of mandible and also apical third to half of male scape pale yellow. Thorax black, but pronotal lobe, tegula, and humeral plate pale yellow. Gaster black. Femora black. minimally yellow at apex in female, with conspicuous
pale yellow spots apically in male (spots longer ventrally than dorsally, largest on forefemur). Tibiae and tarsi: see below. Wings slightly infumate.
ㅇ. - Mandible (Fig, 118e): inner margin with basal tooth and cleft (which varies from narrowly to obtusely angulate), but with no preapical tooth. Clypeus (Fig. $118 \mathrm{a}-\mathrm{d}$ ): disk without teeth or carinae in specimens from Senegal and most from Burkina Faso, but with anteromedian swelling (round or longitudinal) that is glabrous in some individuals; swelling replaced by centrally positioned, narrow, apically emarginate platform in females from Mali, Togo, Ivory Coast, and some from Burkina Faso (Fig. $118 \mathrm{c}, \mathrm{d})$; free margin of lobe almost straight; distance between corners about $2.8 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $1.2 \times$ scar length. Gena with low, longitudinal tooth adjacent to occipital carina, about one-third height from mandible to occiput (as in Fig. 116 g ). Flagellomere 1: dorsal length 1.5-1.6× apical width. Pronotum: precollar delimited laterally by longitudinal carina, side sulcate. Propleuron expanded apicolaterally into round conspicuous process (Fig. 119) whose length is about $0.25-0.5 \times$ basal mandibular width. Forecoxa almost flat, minimally concave anteromesally, more acute anterolaterally (Fig. 119) than in other species. Forebasitarsus with 4 or 5 rake spines; length of apical spine about $1.5 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine about $0.25 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum Il setose throughout. Pygidial plate sparsely punctate, setae inconspicuous except stout apically, Length $6.0-6.6 \mathrm{~mm}$.

Foretibia pale yellow dorsally, red on inner side, black ventrally; midtibia pale sellow dorsally, black or (some specimens) red ventrally; hindtibia pale yellow dorsally, black ventrally. Tarsi all black or reddish apically, foretarsus reddish in some specimens.
8.- Mandible: inner margin without subbasal tooth. Clypeus (Fig. I18f, g): lobe obtusely iridentate (median tooth larger than lateral ones). indistinctly angulate laterally: distance between corners 0.9-1.0 $\times$ distance between comer and orbit. Distance between hindocellar scar and orbit about $1.25 \times$ scar length. Flagellomere I: dorsal length $1.0-1.1 \times$ apical width. Foretrochanteral notch about as long as distance that separates it from trochanteral apex. Forebasitarsus with 2 or 3 rake spines; longest spine $0.2-0.3 \times$ apical width of basitarsus. Dorsum of mid- and hindbasitarsi without preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely setose. Sterna without depressions, setae of sterna 111 and IV, or $111-V$, markedly longer than those on sternum II but not concealing integument. Sternum VIll rounded or narrowly truncate apically. Volsella: Fig. 118 h . Length $4.2-4.9 \mathrm{~mm}$.

Tibiae pale yellow, reddish on inner side (foretibia) or ventrally (mid- and hindtibiae). Tarsi pale yellow basally, light brown apically.

Geographic Distribution (Fig. 71). - Senegal and Mali to Ivory Coast and Togo.

Records - Hololype: ?, SENEGAL: Ndangane 45 aır km SE Mbour, 26 Jul 1991. WJP (CAS). Paratypes: BURKINA FASO: Gourma Kompenga 20 km S Pama, 18-31 May 1988, Sanborne, Landry, and Tou (1 ㅇ, LEM); same data but 30 May-15 June 1988 (18. LEM); same data but $1-16$ Jun 1988 (38. 1 B. CAS; 3 \%. 1 8, LEM $)$.

IVORY COAST: $30-35 \mathrm{~km}$ Korhogo, 17 Apr 1980, J. W Everts (18, ZNA )

MAL1: "Soudan Français, Dogo (Macina)". Jul 1950. G. Remaudiêre (1 ?, FSAG). I interpret the locality as Massina, Mali

SENEGAL: 10 km S Binona, 12 Jul 199 I , WJP( 18 . CAS); Dtattakounda 71 km E Zinguinchor, I3 Jul 1991, WJP (1 8, CAS); 16 km N Fatick, 25 Jul I991, AM ( 1 of, AAM), WJP ( 3 o, CAS): 70 km E Kolda, 14 Jul ! 991 , AM (28, AAM), WJP (28, CAS); Ndangane 45 air km SE Mbour, 26 Jul 1991, WJP (4 8. 5 8, CAS); Tambacounda, I5 Jul 1991, AM ( 3 9, AAM), WJP ( 68,3 8, CAS).

TOGO: Mo Aval [= lower course of Mo, which is $\left.8^{\circ} 45^{\prime} \mathrm{N}, 0^{\circ} 11^{\prime} \mathrm{E}\right], 29 \mathrm{Mar}$ and 5 Jun 1984, collector unknown (I 8, CAS. 1 \&, ZMA); 2 km N Sagbadaı [ $=17 \mathrm{~km}$ NW Sokodé], 22 May 1986, P. E. T. Douben (I \&, LUW).

## Gastrosericus temporalis de Beaumont

(Figures 120-122)
Gastrosericus temporalis de Beaumont. 1955:193. 8. Holotype: ?, Morocco: Marrakech (MZL), examined. - Bohart and Menke, 1976:256 (1sted).

Diagnosis. - The female of temporalis has a distinctive clypeus (Fig. 120a, b): the median, essentially rectangular projection is delimited on each side by a deep impression that extends almost to the frontoclypeal suture. Subsidiary diagnostic characters are: gena with prominent tooth (Fig. I20d), pronotal side sulcate, inner mandibular margin without basal tooth or cleft (Fig. 120c), forecoxa with prominent, triangular expansion (Fig. 120f), and lateral scutal margin gradually rising but not upturned into flange along tegula.

The male is characterized by the following: clypeus all yellow, with a pointed lobe (Fig. 120g, h); lateral scutal margin somewhat expanded and not upturned into flange over tegula, concave between expansion and hindcorner; and gaster all or largely red. The male of eremicus is similar, but in temporalis the lateral portion of the scutum is barely concave and the foretrochanteral notch is markedly broadened distally (Fig. 121b). In erenicus, the scutum has a longitudinal concavity on each side (Fig. 36bd), and the foretrochanteral notch is not broadened distally.

Description.-Mandible: posterior margin notched, abductor ridge evanescent. Labrum: free margin roundly emarginate. Orbit slightly closer to antennal socket than to hindocellar scar. Propleuron simple. Thorax finely microsculptured, scutal punctures barely discernible. Lateral scutal margin slightly expanded and not upturned into flange along tegula, contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin about $3.4-3.75 \times$ apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed, including setae adjacent to oral fossa and on propodeum; mesopleural setae obscuring integument.

Head black, but mandible (except apically), clypeus, and scapal venter yellow or reddish. Thorax all black in most specimens, but red except scutum and scutellum in a female from Gao area: pronotal lobe, tegula, and humeral plate pale yellow. Gaster red (tergum IV or V dark brown in male). Femora red, yellow apically (yellow spots longer ventrally than dorsally, largest on forefemur, smallest on hindfemur), red replaced by black in mate (at least on fore- and midfemora); tibiae red, pale yellow on dorsum or (foretibia) outer side; tarsi yellow or (Moroccan specimens) reddish. Wings almost hyaline.

ㅇ. - Mandible (Fig. 120c): inner margin with rudimentary subbasal tooth, without cleft or preapical tooth; distal portion of abductor ridge only minimally expanded, thus posterior margin stepped rather than notched. Clypeus (Fig. 120a, b): disk without teeth or carinae; lobe with nearly parallel-sided median projection; projection flanked by deep impression that extends to fron-
toclypeal suture; apical margin of projection evenly arcuate or slightly concave mesally; lobe corner ill-defined, located on outer side of impression; distance between corners $1.3-1.4 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $2.0 \times$ scar length. Gena with tooth behind mandibular base (Fig. 120d). Flagellomere I: dorsal length $1.25-$ $1.5 \times$ apical width. Pronotum: precollar carinate laterally, side deeply sulcate. Forecoxa deeply concave along inner margin (except apically); concavity setose, markedly widening anterad, about as wide anteriorly as $0.5 \times$ forecoxal margin, delimited laterally by conspicuous, triangular expansion (Fig. 120f). Forebasitarsus with 5 rake spines ( 4 on one leg in one specimen examined); length of apical spine $1.7 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine about 0.25 $\times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum II finely setose throughout. Pygidial plate mosily with inconspicuous setae, but setae thickened on about apical third (Fig. 120f). Length $4.5-6.0 \mathrm{~mm}$.
f.-Mandible: inner margin without subbasal tooth. Clypeus (Fig. 120g, h): free margin of lobe obtusely pointed, not angulate laterally, forming a curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about $1.7 \times$ scar length. Flagellomere I: dorsal length about equal to apical width. Foretrochanteral notch markedly longer than distance separating it from trochanteral apex (Fig. 121a); bottom glabrous, markedly broadened distally (Fig. 121b). Forebasitarsus with 3 rake spines; longest spine about $1.25 \times$ apical width of basitarsus. Dorsum of midbasitarsus with one or two preapical spines, dorsum of hindbasitarsus with no or one such spine. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna without mesal depressions, microscopically and closely punctate throughout; sternal setae short, even. Sternum VIll roundly truncate apically. Volsella: Fig. 121 h . Length 3.7 mm .

Geographic Distribution (Fig. 122).-Morocco to Senegal, Burkina Faso, and Niger.

Records.-BURKINA FASO: Gourna Kompienga 20 km S Pama (18, LEM). MALI: 30 km W Gao (I 9, CAS), 180 km SW Gao ( 5 p, MS), 25 km E Hombon ( 3 ㅇ.1 1 \&. CAS), 20 km SW San ( 18, CAS. $18 . \mathrm{MS}$ ): 40 km SE Ségou ( $3 \mathrm{q}, \mathrm{CAS}$ ). MAURITANIA: Tayan 7 km W Alar (28, CAS).
MOROCCO. Marrakech ( 2 s, MZL, holotype and paratype).
NIGER: vicinity of Al Mota, $15^{\circ} 47^{\prime} \mathrm{N}, 6^{\circ} 45^{\prime} \mathrm{E}$ (1 8, FSAG).
SENEGAL: 16 km N Fatıck ( $18, \mathrm{CAS}$ ) 40 km ESE Louga ( f , CAS), Tanbacounda (I \&, AAM).

## Gastrosericus thoth sp. n.

(Figures 123-125)
Derivation of Name. - Thoth, a god of ancient Egyptians. with reference to the country of origin; a noun in apposition to the generic name (traditionally spelled Thot in some other languages, e.g., French).

DIAGNOSIS.-One recognition fealure of thoth is a combination of an all red gaster and absence of yellow markings on the hindfemur and the tibiae. The female can also be recognized by the following combination: pronotal side deeply sulcate: pygidial plate setose throughout (all setae stout); gena angulate in lateral view (Fig. 123c); forecoxa shallowly concave, margined anteriorly: and apical tarsomeres with at least one basomedian spine ventrally. The male resembles most moricel in having conspicuously fimbriate but not mesally depressed sterna 111 and IV (as in Fig. 78e, f) in addition to the all red gaster. Unlike moricel,


[^9]

Figure 121. Gastroserscus temporalts: a, male foretrochanter ( $\times 356$ ), h. hottom of trochanteral notch ( - 545).
thoth lacks yellow markings on the hindfemur and the tibiae, as indicated above, and the sharply pointed clypeal lobe helps in identification (Fig. 123d); the clypeal lobe is obtusely pointed in most moricei, but sharply pointed in some.

Description. - Mandible with notched posterior margin, abductor ridge absent. Labrum: free margin broadly emarginate. Orbit closer to antennal socket than to hindocellus. Propleuron simple. Thorax finely sculptured. but individual punctures discernible on scutum. Scutal flange evenly curved throughout. Marginal cell: length of costal margin $2.6 \times$ apical truncation in females, but only $2.0 \times$ in single male examined. Recurrent veins separate.

Vestiture appressed, including setae adjacent to oral fossa (setae subappressed between propodeal side and hindface), obscuring mesopleural integument.

Head and thorax black, but the following are pale yellow: mandible, clypeus, scapal venter, pronotal lobe, tegula, and humeral plate. Gaster red. Femora black or hindfemur (one female) red; fore- and midfemora yellowish at extreme apex. Tibiae and tarsi red. without yellow markings. Wings hyaline.
9.-Mandible (Fig. 123b): inner margin with basal tooth and broad, poorly defined cleft but without preapical tooth. Clypeus (Fig. 123a): disk without teeth or carinae; lobe prominent mesally, its free margin arcuate mesally but concave near corner: distance between corners about $1.9 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $0.6 \times$ scar length. Gena with obtuse tooth behind mandibular base, angulate in profile (Fig. 123c). Flagellomere I: dorsal length $2.4 \times$ apical width. Pronotum: precollar carinate laterally, side sulcate. Forecoxa shallowly concave, marginate anteriorly. Forebasitarsus with 6 rake spines; length of apical spine about $1.9 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine about $0.7 \times$ apical width of tarsomere. Venter of tarsomere V with one or two basomedian spines and with one spine near midlength of each lateral margin. Sternum II apicomesally with glabrous, triangular area. Pygidial plate all covered with stout setae. Length $8.8-9.0 \mathrm{~mm}$.

ס.-Mandible: inner margin without subbasal tooth. Clypeus (Fig. 123d): free margin of lobe pointed, not angulate laterally,
forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about $0.8 \times$ scar length. Flagellomere I: dorsal length $1.5 \times$ apical width. Foretrochanteral notch shorter than distance that separates it from trochanteral apex (Fig. 124a), its bottom sctose (Fig. 124b). Forebasitarsus with 3 rake spines; longest spine about $1.5 \times$ apical width of basitarsus. Dorsum of midbasitarsus with two preapical spines, dorsum of hindbasitarsus with one such spine. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna without depressions, sterna 111 and IV conspicuously fimbriate margin to margin. fimbriae appressed, fully concealing integument, slightly curving ventrad apically. Sternum VIll emarginate apically. Volsella: Fig. I23e. Length 5.7 mm .

Geographic Distribution (Fig. 125).-Known only from Cairo area in Egypt and from Sinai Peninsula.

Records. - Holotype: ㅇ. EGIPT: Wadı Hof mear Caro. 26 June 1936, H Priesner (NHMW). Paratypes: EGYPT AI Qahira (= Carto): same localnty as holotype, 6 June 1937. AM (1 8. CAS). Sina (= Sinal): between Dahab $128^{\circ} 29 \mathrm{~N}$. $34^{\circ} 32^{\prime} \mathrm{E}$ ) and St. Cathenne monastery, 10 June 1991. Ant (18. CAS).

## Gastroserieus tissa Pulawski

(Figures 122, 126, 127)
Gastrosericus tissa Pulawski in Kromben and Pulawskı. 1986:9, \%. 3. Hololype: 3. Sn Lanka Tincomalee District. Tennamaravadi (USNM), exammed. Krombein $m$ Krombein and Pulawskı. 1986: 4 (life history).
Diagnosis. - The female of tissa has a well-defined clypeal lobe, with an evenly arcuate free margin and no discal teeth or carinae (Fig. 126a), the setae of the pygidial plate are inconspicuous (one or two apical setae are stout in some specimens), and the gaster is red basally. Females of chalethorax, clectus. some eurypus, and some karoocnsis are similar, but in tissa the clypeal disk is almost flat, uniformly punctate or with a shiny. glabrous midline (chalcithorax has a glabrous, longitudinal swelling), the distance between corners is twice the clypeal midlength ( $1.5 \times$ midlength in eurypus), the antenna is black and the femora are almost entirely black (flagellum of electus yellow brown or reddish brown ventrally, femora with large yellow

$\%$
$\stackrel{\square}{\square}$


$i \quad i$



spots). Most karooensis differ in having an all black gaster, and some with a basally red gaster also have red femora with apical yellow spots; a less conspicuous but more general difference is in the vestiture of sternum II: in tissa, sternum II has a glabrous
apicomedian area that is several midocellar diameters long, whereas in karooensis the glabrous area is absent or no longer than two midocellar diameters.

In the male, the clypeal lobe has a well-defined corner and a


Figure 124 Giatrosericus thoh a. male foreirochanter ( $\times 198$ ), b, bottom of trochanteral notch ( 4.474 ).


Figure 125 Collecung locahties of (rastronertows thoth and thencrulatus
median tooth (Fig. I26d), the gaster is red basally, and the midbasitarsus is bent (Fig. 126e). The clypeus is similar in the male of siamensis, but in that species the gaster is black and the midbasitarsus is straight.

Description. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin arcuate. Orbit closer to hindocellar scar than to antennal socket in female, equidistant in male. Propleuton simple. Thorax microsculptured, vertex and scutum with inconspicuous, microscopic punctures. Scutal flange minimally expanded adjacent to tegula, contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin 3.0-4.0 $\times$ apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed, including setae adjacent to oral fossa, partly obscuring mesopleural integument; nearly appressed between propodeal side and hindface.

Head black. including clypeus and scape, mandible yellowish (except apex black). Thorax black, pronotal lobe pale yellow. Gastral segments 1. II or 1-III red, remainder black (all sterna red in the single male examined). Femora black except narrowly pale yeliow at apex. Tibiae dark brown, with pale yellow outer side (foretibia) or dorsum (mid- and hindtibiae). Tarsi dark brown. Wings hyaline.
9.-Mandible (Fig. 126b): inner margin with rounded subbasal tooth and cleft but without preapical tooth. Clypeus (Fig. 126a): disk without teeth or carinae, in many specimens with


Figure 126. Gastrosericus tissu a, female clypeus ( $\times 66$ ), b, lemale mandible ( $\times 66$ ), c. Female pygidium ( $\times 112$ ), d. male clypeus ( $~ 84$ ), e, male midbasitarsus ( $\times 110$ ), f, volsella ( $\times 211$ )
shiny, impunctate midline; free margin of lobe arcuate, corner well-defined; distance between corners about $2.5 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $0.7-0.8 \times$ scar length. Gena simple. Flagellomere I: dorsal length $1.5-1.7 \times$ apical width. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 rake spines; length of apical spine about $1.8 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine $1.0-1.2 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum II apicomesally with glabrous, triangular area that is several midocellar diameters long. Pygidial plate with a few microscopic setae, in some specimens also with one or two stout setae at apex (Fig. 126 c ). Length $5.5-6.2 \mathrm{~mm}$.

ठ. - Mandible: inner margin obtusely angulate, almost straight. Clypeus (Fig. 126d): lobe with well-defined corners and median tooth (free margin concave between tooth and corner); distance between corners about $1.5 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about equal to scar length. Flagellomere I: dorsal length about equal to apical width.

Foretrochanteral notch longer than distance that separates it from trochanteral apex (Fig. 127a), bottom margin with row of suberect setae (Fig. 127b). Forebasitarsus with 3 rake spines; longest spine equal to apical width of basitarsus. Dorsum of mid- and hindbasitarsus with one preapical spine each; midbasitarsus curved (Fig. 126e). Inner claws of all tarsi as large as outer claws. Pygidial plate densely punciate but asetose (possibly an artifact). Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII rounded apically. Volsella: Fig. 126f. Length 5.0 mm .

Geographic Distribution (Fig. 122). - Southern India, Sri Lanka.

[^10]

Figure 127. Gastrosericus ussa: a, male foretrochanteral notch ( $\times 395$ ); b, bottom of trochanteral notch ( $\times 790$ ).

USNM), Sılavathuraı (18. USNM), Silavathura, Kondachchı (3 \&. CAS, 3 ㅇ. NMC; 18, USNM). Trincomalee District Tennamaravadı (1 B, holotype, USNM)

Gastrosericus truncatus $\mathrm{sp} . \mathrm{n}$.
(Figures 128-130)
Derivation of Name. - Truncatus, a Latin masculine adjective. meaning truncate; with reference to the shape of the female clypeus.

Diagnosis.-Like ammochares, evemucus, and temporalis. truncatus has a characteristic scutum whose lateral margin, gradually rising but not upturned into a flange, is expanded over the tegula (markedly so in eremicus, slightly so in the other three) and contrastingly concave near the hindcorner (Fig. 3b). Subsidtary recognition features of the females are: gena conspicuously dentate (Fig. 128d), pronotal side sulcate, inner mandibular margin without basal tooth or cleft (Fig. 128c), and vertex broad (Fig. 128a), distance between hindocellar scar and orbit $2.0 \times$ or more scar length. The female of tmomeatus has a unique clypeus: the middle lobe is projecting mesally into a secondary lobe, an essentially rectangular prominence (Fig. 128a, b) whose corners are markedly closer to each other than to orbit; the free margin is concave but not emarginate between the prominence corner and the lobe corner. Unlike the other three species, the forecosa of the lemale truncatus is not concave along the inner margin.

The male of truncutus has an all or largely black clypeus with a pointed lobe (Fig. 128e, f), the lateral scutal margin as described above, and the gaster is all or largely red. Males of eremucus and temporalis are similar, but the scutal flange of truncatus is less expanded than in these species (see Fig. 36bd), the scutum is not swollen laterally (swollen in eremicus), the elypeus is all or largely black (yellow in temporalis and most eremicus), and the bottom of the trochanteral notch is not broadened distally (Fig. 129), while broadened in temporalhs (Fig. 121a, b).

DESCRIPTION. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin broadly, shallowly concave. Orbit slightly closer to antennal socket than to hindocellus.

Propleuron simple. Thorax finely sculptured, scutal punctures ill-defined. Lateral scutal margin somewhat expanded adjacent to tegula, contrastingly concave between expansion and hindcorner (Fig. 3b). Marginal cell: length of costal margin 3.6-5.2 $\times$ apical iruncation. Recurrent veins interstitial above or confluent in a short petiole.

Vestiture appressed, including setae adjacent to oral fossa, but propodeal setae semiereet between dorsum and side; mesopleural setae obscuring integument.

Head black, but clypeal lobe red brown anteriorly in females and many males; lateral section in most specimens with yellow spot anterolaterally, near mandibular articulation (spot largely concealed by vestiture); mandible, scapal venter (except some females), and scapal apex yellow; flagellum all black or yellowish brown ventrally. Thorax black except pronotal lobe, tegula, and humeral plate pale yellow. Gaster red, apical segments dark brown in most males. Femora red or black basally, pale yellow apically (yellow spots longer ventrally than dorsally). Tibiae largely yellow, but foretibia reddish on inner side and mid- and hindtibiae reddish ventrally. Tarsi yellow. Wings hyaline.
8. - Mandible (Fig. 128c): inner margin with no basal tooth, clelt. or preapical tooth. Clypeus (Fig. 128a, b): disk without teeth or carmae; central portion of lobe expanded into truncate projection; free margin concave between projection and welldefined corner: distance between comers $1.5 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $1.7 \times$ scar length. Gena, above mandibular base, with longitudinal carma that is expanded into tooth at dorsal end (Fig. 128d) and also at ventral end in large specimens. Flagellomere 1: dorsal length about $1.3 \times$ apical width. Pronotum: precollar carinate laterally except not carinate in the smallest specimens; side deeply sulcate. Forecoxa concave anteromesally, foremargin carinate, expanded into tooth admesally. Forebasitarsus with 5 rake spines; length of apical spine about 1.7 $\times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine about $0.25 \times$ apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II apicomesally punctate and setose throughout. Pygidial plate with fine, incon-


Figure 128. Gastrosericus truncatus: a, femate head ( 41 ); b, female clypeus ( $\times 85$ ), c, female mandible ( $\times 81$ ), d, female head laterally ( $\times 55$ ); e, male head ( $\times 56$ ); f, male clypeus $(\times 97$ ); g , volsella ( $\times 306$ ).
spicuous setae except setae stout on apical third or fourth. Length $4.0-6.2 \mathrm{~mm}$.

む. - Mandible: inner margin without subbasal tooth. Clypeus (Fig. 128e, f): free margin of lobe pointed, not angulate laterally, forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about $1.6 \times$ scar length. Flagellomere I: dorsal length about $1.2 \times$ apical width. Fore-
trochanteral notch markedly longer than distance that separates it from trochanteral apex: notch bottom setose, setae erect (Fig. 129a, b). Forebasitarsus with 3 or 4 rake spines; longest spine $1.5 \times$ apical width of basitarsus. Dorsum of midbasitarsus with one preapical spine, dorsum of hindbasitarsus without such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna without median de-


Figure 129 (iastroserizu irmoutm. a, male foretrochanter ( $\times 316$ ), b, bottom of trochanteral notch ( $\times 553$ ).
pressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII rounded apically. Volsella: Fig. 128 g . Length $3.5-4.3 \mathrm{~mm}$.

Geographic Distribution (Fig. 130).-Senegal io Niger.
Records,-Holotype: MAII. Hombor, 11 Aug 1991, WIP(CAS) Paratypes: MALI (all specmens collected in 1991): Doueniza. 19 Aug, MS (38. 2 8, MS). WJP (18, CAS), Gao. 14 Aug, WJP ( 18 , CAS), 10 km N Gao. 15 Aug, MS 128. MS): 30 km W Gao, 15 Aug, MS (5 q, MS) ; 158 km SW Gao, 13 Aug. MS ( 5 ? MS). WJP (28. CAS), Hombori, 11 Aug, MS ( 9 8, MS), WJP (3 q, CAS), same locality, 12 Aug. MS $(28.2$ \& MS, 10 km E Hombon, 13 Aug, MS 148.48 . MS), 18 Aug ( 1 \&, MS) 25 km E Hombon, 13 Aug, WJP(118, CAS), same locality. 18 Aug. WJP ( 3 \&. CAS), 30 km NE Hombon. 18 Aug. MS (5s, 1 \&, MS); 10 km E Aloptı. 8 and 10 Aug. MS (59. MS), 7 Aug. MS ( 1 s. MS).WJP (79. 1 s, CAS); same localıt!, 10 Aug. WJP 28,4 \%. CAS), same localıt!, 20 Aug, WJP (28. CAS), 40 km W Mopu, 9 Aug, MS (29, MS), 7 km S San, 22 Aug. WJP (19. CAS): 60 km NE San, 6 Aug, WJP ( 1 b, CAS). 100 km NE San. 21 Aug, WJP ( 1 9. CAS), 20 km SW San, 22 Aug, MS (2 8, MS): 40 and 70 km NE Segou, 2 Aug MS (28, MS)

NIGER Abalah, $15^{\circ} 28^{\prime} \mathrm{N}, 6^{\circ} 16^{\prime} \mathrm{E}, 14$ Aug 1987. AP (1咅, 1 各, FSAG; 18, CAS) Ga7aoua, $13^{\circ} 33^{\prime} \mathrm{N}, 7^{\circ} 54^{\prime} \mathrm{E}, 11 \mathrm{Aug}$ 1987, AP (19, FSAG).

SENEGAL. Ndangane 45 aır km SE Mbour, 26 Jul 1991 , WJP (18.CAS).
Gastrosericus tuberculatus sp. n.
(Figures 125. 131. 132)
Derivation of Name. - Tubercukutus, a Latin masculıne adjective derived from tuberculus, a little tubercle; with reference to the tuberculate clypeus of the female.

Diagnosis. - The female of tuberculatus has a distinctive median tuberele on the clypeal disk (Fig. 131a-e). Some pratensts are similar, but unlike that species the forecoxa of tubercukatus has no apical process, and the mesopleuron has no oblique ridge.

In the male, the clypeus is all black, with a sharply pointed lobe (Fig. 131j, k), the setae are appressed on the vertex and adjacent to the oral fossa, and inner and outer claws of each pair are equal in size. Other species are similar (bambara, modestus. sabulosus, truncatus), but tuberculatus differs in having sternum V1II conspicuously emarginate apically (Fig. 132a) rather than rounded, truncate or shallowly emarginate.

Description.-Mandible: posterior margin notched, abduclor ridge present. Labrum: free margin acutely emarginate. Orbit
closer to hindocellar scar than to antennal socket. Propleuron simple. Thorax finely punctate, but individual punctures discernible on scutum. Scutal flange evenly eurved throughout. Marginal cell: length of costal margin $3.2 \times$ apical truncation. Recurrent veins interstitial above or confluent in a short petiole.

Setae appressed on head and thorax (including those adjacent to oral fossa) but semierect between propodeal side and hindface: obscuring mesopleural integument.

Head black, including clypeus and seape: male flagellum yellowish brown ventrally: mandible yellowish reddish basally, black apically. Thorax black, pronotal lobe yellow posteriorly; tegula brown, with small yellow spol (female) or yellow, brown posteriorly (male); humeral plate brown (female) or yellow, brown basally (male). Gaster all black or segments I and II red. Wings infumate (slightly so in male).
9.- Mandible (Fig. 1311): inner margin with basal tooth and widely open cleft but without preapical tooth. Clypeus (Fig. 131a-e): disk with median tubercle; free margin of lobe variously shaped (see Local Variation below), corner well-defined; distance between corners $2.3 \times$ distance between corner and orbit. Distance between hindocellar sear and orbit about $1.4 \times$ sear length. Gena with tooth or tuberele adjacent to occipital carina, slightly below mandibular base (Fig. 131g, h). Flagellomere 1: dorsal length $1.8 \times$ apical width. Pronotum: precollar carinate laterally, side deeply sulcate. Forecosa shallowly coneave anteromesally, foremargin carinate. Forebasitarsus with 5 or 6 rake spines; length of apical spine $1.3 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apieal spine about $0.4 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spınes. Sternum 11 setose throughout. Pygidial plate sparsely setose in anterior half, densely setose in posterior half (Fig. 131f). Length 7.9-13.0 mm.

Femora black, narrowly red apically. Tibiae red except hindlibia narrowly yellow basodorsally. Tarsi reddish brown.
ô. - Mandible: inner margin obtusely angulate. Clypeus: lobe sharply pointed. free margin forming single curved line with resi of clypeal margin (Fig. 131j, k). Distance between hindocellar scar and orbit about $1.2 \times$ scar length. Flagellomere I: dorsal

length $1.0-1.3 \times$ apical width. Foretrochanteral notch longer than distance that separates it from trochanteral apex (Fig. 132b); notch bottom covered with subappressed setae that are oriented toward coxa (Fig. 132c). Forebasitarsus with 4 rake spines; longest spine equal to apical width of basitarsus. Dorsum of midbasitarsus and of hindbasitarsus with no preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VllI emarginate apically (Fig. 132a). Volsella: Fig. 131(1). Length $5.6-8.8 \mathrm{~mm}$.

Femora black, yellow apically (narrowly so on mid- and hindlegs). Foretibia yellow, brown on inner side: mid- and hindtibiae black or brown, yellow dorsally. Tarsi brown.

Local Variation.-Specimens from Khorixas area in Damaraland differ markedly from other specimens in proportions, size, and color, as described below.

Windhoek and Karibib Districts: Female: free margin of clypeal lobe almost straight, without emarginations (Fig. 131b); clypeal tubercle closer to free margin than to frontoclypeal suture (Fig. 131d); genal tooth moderately prominent (Fig. 131g), not connected to mandibular condyle by a carina. Male: clypeal lobe



 showing mdsodual varmaton ( 48 ) 1. wolsella ( $\times 207$ )


Figure 132. Gastrosertus twherctutus: a, male stermum VIII, ventral view ( . 31); b. male foretrochanter ( $\times 103$ ). c. bottom of foretrochanteral notch ( $~ 205$ ).
moderately elongate (Fig. 131j). Gastral segment 1 red, also segment II red in females and some males, remainder black; body length $7.9-9.8 \mathrm{~mm}$ in female, $5.6-6.8 \mathrm{~mm}$ in male.

Khorixas area: Female: free margin of clypeal lobe essentially arcuate, sinuate or emarginate on each side, thus subdivided into three portions, middle portion arcuate (Fig. 131c); clypeal tubercle closer to frontoclypeal suture than to free margin (Fig. 131e); genal tooth markedly prominent (Fig. 131h), connected to mandibular condyle by obtuse carina. Male: clypeal lobe markedly elongate (Fig. 131k). Gaster in both sexes black; body length $10.0-13.0 \mathrm{~mm}$ in female, 8.8 mm in male.

Life History. - My friend and traveling companion in Namibia, Herr Maximilian Schwarz, collected three females of tuberculatus with prey 38 km W Khorixas on 4 March 1990. He watched one female dragging the prey backwards, holding
it by a hindleg with her mandibles. All prey were phytophilous acridids (det. N. D. Jago): a nymph of Pseudothericles compressifions (Stål), a female of Thericles conspersus (Karny), and a nymph of Acanthacrs ruficornis ruficornis (Fabricius). The first two are members of Thericleidae (Eumastacoidea), an African family in which the adults are flightless and hence even the adults look nymph-like; the third belongs to Cyrtacanthacridinae (Acrididae).

Geographic Distribution (Fig. I25), -Namibia.

Records. - Hololype: 9, NAMIBIA. Karibib District: 50 km SW Usakos, 21 Feb 1990, WIP (CAS). Paratypes: NAMIBIA: Damaraland 38 km W Khonaas, 4 Mar 1990, MS (29, CAS, 78 8, MS), WJP (38.18, CAS). Karibib District 17 km W Usakos, 21 Feb 1990, WJP (2 8, CAS); same data as hololype (1 ㅇ, 2 8, CAS), MS (18. 1 s. MS); 55 km SW Usakos, 25 Feb and I Mar 1990, MS (18. CAS; 4 ㅇ, $18, \mathrm{MS}$ ). WJP (19.28, CAS); 65 km SW Usakos, 24 Feb 1990, MS (18, 48 ,




MS). WJP (23. CAS). Windhoek District 2217Ca [= between 22030 and 220.45'S and $17^{\circ} 00^{\circ}$ and $17^{\circ} 15^{\prime} \mathrm{EJ}, 4-8$ Nor 1973, collector unknown (18. SMNW).

Gastrosericus turneri Arnold
(Figures $130,133,134$ )
 (SAM), evamaned, - Arnold. 1929:382 (8), Boharl and Menke, 1976:256 (hsted).

Diagnosis. - The female of furnern has a distinetive clypeus: lobe free margin with a markedly prominent middle portion which is flanked by two lateral teeth on each side, clypeus middle section with a U-shaped, V-shaped or Y-shaped carina (Fig. 133a). Erect vertex setae (Fig. 133d) help recognition.

In the male, the head and thorax are finely punctate and have stranght setae, the elypeal lobe is acutely pointed (Fig. 1331), and the vertex setae are erect (Fig. 133d): setal length about 0.3-0.4

* basal width of mandible. Gastrosericus neaver is similar, but unlike that species the face, vertex, and thorax are finely punctate in turneri: and the setae are no longer on vertex than between the mandibular base and occipital carina. According to Arnold (1929), flagellomere 1 is thickened in the male of turneri, but 1 found this modification only in the single specimen he studied and not in other individuals.

Description. - Mandible: posterior margin notehed, abduetor ridge present. Labrum: free margin acutely emarginate. Orbit insignifieantly closer to hindocellar sear than to antennal socket in female, but closer to antennal socket than to hindocellar sear in male. Propleuron simple. Thoracic sculpture fine, scutum and mesopleuron with well-defined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin 4.0$5.4 \times$ apical truncation. Recurrent veins separate, almost interstitial above in female from Serowe.


Figure 134 (iastroseracus fiment: a, male foretrochanter ( $~ 208$ ), h, bottom of trochanteral notch ( $* 948$ ).

Setae erect adjacent to oral fossa, equal to $0.3-0.4 \times$ basal mandibular width; nearly erect on vertex (Fig. 133d), of same length as those adjacent to oral fossa; inclined, not obscuring integument on mesopleuron; semierect between propodeal side and hindface.

Head black, including scape. Mandible pale yellow, black apically. Thorax black, but pronotal lobe, tegula, and humeral plate pale yellow. Gaster in most specimens black except for reddish pygidial plate in many females and tergum VII of many males, but segment I reddish in the female from Tanzania. Femora black except forefemur (or fore- and midfemora) yellow apically; also hindfemur of many specimens narrowly yellow at apex. Foretibia ferruginous, yellow on outer side; mid- and hindtibiae dark brown to reddish brown, yellow dorsally. Tarsi dark brown to ferruginous. Wings weakly infumate, almost hyaline.
8.-Mandible (Fig. 133b): inner margin with cleft and two subbasal teeth (distal tooth evanescent in some specimens) but without preapical tooth. Clypeus (Fig. 133a): disk with glabrous, obtuse carina mesally (carina U-shaped, V-shaped or Y-shaped); free margin of lobe with angulate projection next to well-defined corner, broadly, roundly expanded mesally, shallowly concave between corner and lateral projection and deeply, broadly so between lateral and median expansion; distance between corners $2.6-3.1 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $1.2 \times$ scar length. Gena with tooth about one quarter of distance from mandible to occiput (Fig. 133c). Flagellomere I: dorsal length $1.4-1.8 \times$ apical width. Pronotum: precollar with obtuse lateral, longitudinal carina; side deeply sulcate. Forecoxa shallowly concave along inner margin, foremargin carinate and, in most specimens, obtusely prominent near midlength. Forebasitarsus with 5 rake spines; length of apical spine $1.4 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine about $0.8 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Outer claw slightly larger than inner one. Sternum II finely pubescent throughout. Pygidial plate punctate (most punctures more than one diameter apart), setae stout on apical half or so (Fig. 133e). Length $6.6-7.3 \mathrm{~mm}$.

क. - Mandible: inner margin obtusely angulate, nearly straight. Clypeus (Fig. 133f): lobe sharply pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about 1.8 $\times$ scar length. Flagellomere I: dorsal length 1.2-1.4 $\times$ apical width. Foretrochanteral notch shorter than distance that separates it from trochanteral apex (Fig. 134a), its bottom with appressed, scale-like setae (Fig. 134b). Forebasitarsus with 2-4 rake spines; longest spine $0.8-1.0 \times$ apical width of basitarsus. Dorsum of midbasitarsus with no or (some specimens) one preapical spine, dorsum of hindbasitarsus without such spines. Inner claws of mid- and hindtarsi smaller than outer claws. Pygidial plate densely setose. Sterna without mesal depressions, minutely, closely punctate throughout; setae of sterna III-V (except basally) dense, concealing integument, markedly longer than setae of sternum 11 basally. Sternum VIII rounded apically. Volsella: Fig. 133 g . Length $4.5-6.5 \mathrm{~mm}$.

Geographic Distribution (Fig. 130). - Africa south of the equator.

Records. - BOTSWANA: Serowe ( 19.4 f, CAS; I fo, USNM, 18, 3 \%, ZMK). NAMIBIA: Karibib Districı: 15 km W Kanbıb ( 18, CAS).
SOUTH AFRICA: Natal: Zululand: 20 mi S Ndumu Game Reserve Camp (2 \&, CAS, UCD) Transval Ellısras (28, AMG), Guernsey Farm 15 km E Klaserie ( 1 o. PAM), Loskopdam Nature Reserve, $25^{\circ} 25^{\circ} \mathrm{S} .29^{\circ} 20^{\prime} \mathrm{E}(1$ \%. 2 万, NC1P), ModJadj1 Nature Reserve, $23^{\circ} 38^{\prime} \mathrm{S}, 30^{\circ} 20^{\circ} \mathrm{E}\left(18\right.$, NCIP). Mogol Nature Reserve. $23^{\circ} 58^{\prime} \mathrm{S}$. $27^{\circ} 45^{\prime}$ E ( 1 8, NCIP), Mooketsi (18, CAS, 3 \&, USND), Pafun in Kruger Natıonal Park, $22^{\circ} 26^{\prime} \mathrm{S}, 31^{\circ} 12^{\prime} \mathrm{E}\left(18\right.$. NCIP), Rustenburg Nature Reserve, $25^{\circ} 40^{\prime} \mathrm{S}$. $27^{\circ} 12^{\prime} \mathrm{E}$ (2 $8, \mathrm{NCIP}$ ) 5 mi W Warmbad ( 18, USNM).

TANZANIA: Same ( $19, Z S B S$ ).
ZIMBABWE: Bembesı (29. SAM), Bulawayo ( 68 including lectotype of turnert. 1 of described by Arnold. 1929. SAM), Insiza River (1 8, SAM), Victona Falls (1 Q, BMNH ).

Gastrosericus unicolor Arnold, new status
(Figures 135-137)
Gastrosericus Braunsi Arnold var umoolor Amold, 1929:382, 早. Holotype: \&, Zımbabwe: Sawmills (SAM), examined - Arnold, 1930:2 (listed). - As Gastrosericus braunst umiolor: Bohart and Menke, 1976:256 (raised to subspecies, listed).

 dypeus $\left(\times 8^{9}\right)$, f. volsella $(\times 188)$

Diagnosis. - Females of umicolor; lepudus, and sahulosus have a similar clypeus (Fig. 135a): the lobe has no lateral corner and its free margin is subdivided into three arcuate portions (the median is the largest); and the clypeal disk has no tubercle. Subsidiary recognition features common to all three species are:
gena with tooth (Fig. 135d), which is small in some individuals, and pronotal side deeply sulcate. Unlike sabulosus, the apical tarsomeres of unicolor have no basoventral spines and the clypeus of most specimens is yellow (at least partly) rather than black. Unlike lepidus, the clypeal disk is raised and glabrous



along the midline (except basally), the forecoxa is concave anteromesally and raised near the foremargin midlength, and the gaster of most specimens is largely black with yellow or red markings (at least the apical depression of tergum V). In lepidus, the clypeus has a transverse or Y -shaped swelling, the forecoxa is flat, and the gaster is red. The female of herero is also similar, but has several distinctive characters listed under that species (p. 64).

Males of unicolor are difficult to characterize. Their basic features are: setae appressed adjacent to oral fossa and on vertex, clypeus all yellow (most specimens) or black basally, clypeal lobe acutely pointed (Fig. 135e), gaster largely black (including tergum 1 basally): and length $4.6-6.5 \mathrm{~mm}$. They differ from
herero. lepidus, and most pratensis in having the inner claws of the mid- and hindtarsi smaller than the outer claws, but this condition is also found in the largest pratensis (about 8.0 mm long). Specimens from Senegal have distinctive pale yellow apical depressions on terga V and VI and large, yellow spots on femora. Specimens from eastern and southern Africa resemble pratensis in lacking yellow gastral and femoral markings but differ in having tergum 1 black basally (red basally in most pratensis). Unlike modestus, sterna of unicolor lack rows of erect setae and the head is narrower in frontal view than in that species (see Figs. 75d, 1 ).

DESCRIPTION. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin broadly emarginate. Orbit
equidistant from antennal socket and hindocellar scar. Propleuron simple. Thoracic punctation fine, scutal punctures minute, barely discernible. Scutal flange evenly curved throughout. Marginal cell: length of costal margin $4.4-5.0 \times$ apical truncation. Recurrent veins separate or interstitial above.

Vestiture appressed, including setae adjacent to oral fossa; propodeal setae semierect between side and hindface; mesopleural setae not obscuring integument in most specimens, but obscuring it in specimens from Senegal.

Color varying geographically (see Geographic Variation below). Head black, mandible yellow except black apically, clypeus and scape variable; thorax black but pronotal lobe, tegula, and humeral plate yellow; gaster black, with red or yellow areas on apical half. Wings hyaline.
8. - Mandible (Fig. 135b): inner margin with subbasal tooth and obtusely angulate cleft but no preapical tooth. Clypeus (Fig. 135a): disk without teeth or carinae, but with longitudinal impunctate and glabrous swelling (except basally); Iobe corner illdefined, lobe free margin subdivided into three arcuate portions (median portion the largest). Distance between hindocellar scar and orbit about $1.6 \times$ scar length. Gena with footh just above level of mandibular base (Fig. 135 c ); tooth small in some individuals. Flagellomere 1: dorsal length 1.3-1.4 $\times$ apical width Pronotum: precollar with lateral, longitudinal carina; side sulcate. Forecoxa concave anteromesally, with obtuse process near foremargin. Forebasitarsus with 5 or 6 rake spines; length of apical spine $1.3-1.4 \times$ apical width ol basitarsus. Foretarsomere IV: length of inner apical spine $0.2-0.4 \times$ apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II pubescent throughout. Serae of pygidial plate stout except on basal half or so (Fig. 135d). Length $7.0-9.0 \mathrm{~mm}$.
o.-Mandible: inner margin with no subbasal tooth. Clypeus (Fig. 135e): lobe sharply pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Fagellomere 1: dorsal length $1.15 \times$ apical width. Distance between orbit and hindocellar scar about $1.3 \times$ scar length. Foretrochanteral notch longer than distance that separates it from trochanteral apex (Fig. 136a), with microscopic, erect setae along bottom, which is glabrous (Fig. 136b). Forebasitarsus with 2-4 rake spines; longest spine about $0.75-1.0 \times$ apical width of basitarsus. Inner claws of mid- and hindtarsi smaller than outer claws. Pygidial plate densely punctate and setose except several punctures at center more than one diameter apart. Sterna without median depressions, mınutely, closely punctate throughout; setae somewhat denser on sterna III-V than on sternum II, concealing integument from several angles. Sternum VIII rounded or narrowly truncate apically. Volsella: Fig. 135f. Length 4.66.5 mm .

Geographic Variation.-Specimens from various areas differ in the mesopleural vestiture and coloration of various body parts, as described below:

Clypeus. Pale yellow in Senegalese specimens and some individuals from other areas; pale yellow to black in specimens from Burkina Faso; narrowly black basally (also apically in male) in most specimens from eastern and southern Africa.

Antenna. The scapal venter is either all yellow or black in basal half in specimens from Senegal, black or brown red in specimens from Burkina Faso, all red in females from Tiwi Beaches, Kenya, and in specimens from southern Africa brownred in femate and largely brown in male. The flagellum is black
in most specimens, but largely red in females from Tiwi Beaches, Kenya.

Mesopleuron. The mesopleural vestiture conceals the integument in the specimens from Senegal, but not in those from eastern and southern Africa.

Gaster. In most Senegalese specimens, the following are pale yellow: female tergum $V$ except a pair of basal black spots, tergum IV partly in some specimens, and the pygidial plate (all or on basal half); apical depressions of male terga V and VI as well as part of pygidial plate. In a female from Tambacounda, Senegal, the gaster is black except segments V and VI are red. In specimens from Burkina Faso, the female gaster is all black or the apical depression of tergum V and the pygidial plate are yellowish reddish. In specimens from eastern and south Africa. female terga 1-IV have large brown-red zones preapically, and segments V and VI are all red; the apical depressions of male terga are translucent and tergum VII is reddish.

Femora. In most Senegalese specimens, the femora are black, with large apical pale yellow spots that are Ionger ventrally than dorsally; the black is replaced by red in a female from Tambacounda. In specimens from Burkina Faso, the femora are either red or black, and the apical yellow spots are absent on the hindfemora. In specimens from other areas, the femora are red, withouf yellow spots, except the hindfemur is largely brown in a female from Serowe, Botswana.

Tibiae. In all but one Senegalese specimens, the tibiae are yellow, reddish ventrally (all yellow basally and apically) except the foretibia is reddish on outer side. In the other specimens (including the female from Tambacounda. Senegal), the tibiae are red, the foretibia is yellow on the outer side and the remaining tibiae are yellow dorsally; the red is replaced by black on all tibiae in some females from Burkina Faso and on the hindtibia in the female from Serowe. Botswana.

Tarsi. Yellow (somewhat darkened apically) in Senegalese specimens, black in some from Burkina Faso, red in the other ones.

Geographic Distribution (Fig. 137).-Senegal and Burkina Faso to Kenya, south to Transvaal and Namibia.

Records. - BOTSWANA. Serowe ( 1 ㅇ, 1 fo, ZMK).
BURKINA FASO: Gourma komplenga 20 km S Pama 12\&, 1 8. CAS; 4\&, 1
ס. LEM).
KENYA. Tiw Beaches, $04^{\circ} 14^{\prime}$ S. $39^{\circ} 36^{\prime} \mathrm{E}$ (28, CAS, ZMK).
NAMIBIA Okahandja District Okahandja (1\&.1 ס, BMNH).
SENEGAL. Kaffrne ( 18, CAS), Ndangane ( 28,18, AAM, 18, CAS) 3 km W Samba Dia or 70 aır km W Kaolack ( 3 f., AAM, 3 \&, 19 f., CAS), $25-35 \mathrm{~km} \mathrm{~S}$ Richard Toll (29. LUW. 3q. ZMA). Tambacounda (I \&, AAM). Zigunchor (1 f, ZMA).

SOUTH AFRICA. Transıaal Pafuri in Kruger National Park, 22026'S. $31^{\circ} 12^{\prime} \mathrm{E}$ (1) 5. NCIP). Nylsvleı Nature Reserve, $24^{\circ} 39$ S, $28^{\circ} 42^{\prime} \mathrm{E}$ ( 1 \&, CAS)

ZIMBABWE: Bulawayo ( 2 q. 1 f SAM), Sawmills (1 \&. SAM, holotype of untcolor).

## Gastrosericus vedda Pulawski

(Figures 138-141)
Gastrosertcus wedda Pulawski $\boldsymbol{m}$ Krombem and Pulawskı, 1986:13, s, f. Holotype: Q. Srı Lanka: Amparaı Dısırict Panama, Radella Tank (USNM), examıned.

DIagnosis. - The female of redda can be recognized by a sulcate pronotal side combined with a nondentate gena and basoventrally spinose apical tarsomeres (Fig. 140c, d). The sinuous. laterally incised free margin of the clypeal lobe is also distinctive (Fig. 138a-d).


Figure 138. Gastrosertews vedda* a. female head, Saudı Arabia ( $\times 53$ ); b, female clypeus, Saudı Arabia ( $\times 93$ ); c, same obliquely ( $\times$ Io7); d, femate clypeus. Sn Lanka ( $\times 90$ ): e, female clypeus obliquely. Pakistan ( $\times 146$ ): f. female mandıble, Saudı Arabia ( $~ 140$ ); g, same, Sri Lanka ( $\times 98$ ), h, pygidial plate of female ( $x$ 124).


Figure 134 fasmosericus wedded a, male clypeus ( $\times 102$ ) ; $b$, outhe of male clypeus showing individual vanation ( -112 ) c, volsella ( -312 ).

The male has an all or largely yellow clypeus with characteristically prominent, round lobe corners that are markedly closer to orbits than to each other (Fig. 139a, b), and subsidiary recognition features are: gaster without yellow fasciae and sternal setae short, appressed.

Two unique structures are found in many but not all vedda. One is the postspiracular carina expanded into a rounded lamella that partly covers the anterior part of the subalar fossa (Fig. 140a, b). The other is an anterolateral tooth on the middle section of the female clypeus (Fig. 138c, d).

Description. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin arcuate or (most females) shallowly emarginate. Orbit equidistant from antennal socket and hindocellar scar. Propleuron simple. Thorax finely punctate, but individual punctures discernible on scutum. Scutal flange evenly curved throughout or slightly expanded adjacent to tegula and contrastingly concave between expansion and hindcorner. Postspiracular carina of many specimens expanded into rounded lamella that partly covers anterior part of subalar fossa (Fig. 140a, b), but expansion inconspicuous in many African specimens. Marginal cell: length of costal margin 2.3-3.3 $\times$ apical truncation. Recurrent veins separate or interstitial above.

Vestiture appressed, including setae adjacent to oral fossa and on propodeum, largety obscuring mesopleural integument.

Head black, but mandible (except apex), clypeus all or largely
(including lateral section), and scapal venter yellow or yellowish reddish; flagellum yellowish brown ventrally except all black in some males. Thorax black, but pronotal lobe posteriorly and also laminar expansion beneath subalar fossa in most specimens are pale yellow. Gaster black, red basally in Indian and Sri Lankan females. Tibiae ferruginous, pale yellow dorsally (foretibia yellow on outer side): ferruginous only ventrally in African specimens. Tarsi ferruginous, yellow in Ghanaian and Malian females. Wings hyaline.

ㅇ. - Mandible (Fig. 138f, g): inner margin with subbasal tooth but without cleft or preapical tooth. Clypeus (Fig. 138a-e): disk with or without teeth (see Variation below); free margin of lobe sinuate, shallowly emarginate mesally in single female from Chenab River bank, Pakistan; incised next to corner; corner well-defined (both corner and incision may be difficult to see because of vestiture); distance between corners $2.4 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about 1.2-1.3 $\times$ scar length. Gena simple. Flagellomere I: dorsal length $1.0-1.2 \times$ apical width. Pronotum: precollar not carinate or weakly carinate laterally, side shallowly sulcate. Forecoxa somewhat flattened to slightly concave. Forebasitarsus with 4 or 5 rake spines: length of apical spine $0.8-1.1 \times$ apical width of basitarsus. Foretarsomere IV: Iength of inner apical spine about $0.25 \times$ apical width of tarsomere. Tarsomere $V$ with several basoventral spines and also with spines on each lateral margin (Fig. 140c, d). Sternum 11 apicomesally glabrous or sparsely setose. Most setae of pygidial plate thin, inconspicuous except setae stout apically (Fig. 138h). Length $4.0-5.5 \mathrm{~mm}$.
ô. - Mandible: inner margin obtusely angulate. Clypeus (Fig. 139a, b): lobe short, scarcely more prominent than lateral sections, its free margin sinuate, corner prominent (concealed by setae); distance between corners $1.5 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $1.2 \times$ scar length. Flagellomere I: dorsal length about $0.8 \times$ apical width. Foretrochanteral notch not clearly delimited distally but longer than distance that separates it from trochanteral apex; notch bottom with a row of suberect setae (Fig. 140e, 1). Forebasitarsus with 2-4 rake spines; longest spine about $0.6 \times$ basitarsus apical width. Dorsum of mid- and hindbasitarsus without preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna without median depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII rounded or truncate apically. Volsella: Fig. 139c. Length $3.0-4.5 \mathrm{~mm}$.

VARIATION. - The clypeal disk has a pair of conspicuous discal teeth in most females from Mali and the single females from Ghana and Saudi Arabia (Fig. 138b, c). The tecth are small (Fig. 138a. e) or reduced to small. longitudinal tubercles in some specimens from Mali and the single specimen from Pakistan, and absent in females from Sri Lanka and the only female from Bombay area. India. They are asymmetrical in size in some individuals.

Geographic Distribution (Fig. 141).-Gastrosericus vedda is known from two widely separated areas: one is West Africa, the other includes Saudi Arabia, Pakistan, India, and Sri Lanka. The gap is apparently due to insufficient collecting rather than a disjunct range.

[^11] CAS).


Figure 140. Gastrosericus vedda: a, upper mesopleuron of femate ( $\times 165$ ), b, postspiracular canna and subalar fossa ( $\times 375$ ), c, apical hindtarsomere of female dorsally ( $\times 405$ ) : d, same, ventrally ( $\times 540$ ), e, mate forelrochanter ( $\times 263$ ); f, bottom of foretrochanteral notch ( $x 525$ ).
${ }^{105}$
$90^{\circ}$
$15^{\circ}$

$:$

$\dot{\square}$



i-



Figure 142. Gastrosericus waltu: a, female head ( $\times 28$ ), b, female clypeus ( $\times 64$ ); c, female mandible ( $\times 68$ ); d, male head ( $\times 29$ ); e, male clypeus ( $\times 61$ ); f, volsella, Moroccan specimen ( $\times 234$ ); g, volsella, Egyptıan specimen ( $\times 226$ ); h, volsella, Iranıan specımen ( $\times 219$ ); , volsella, specimen from Uzbekistan ( $\times 226$ ).

INDIA: Gujarat: Deesa ( 18 , CAS). Maharashtra Kinshnagin Upavan Natıonal Park 12 arr km NNW Bombay International Arport (1 \&, CAS).

MALI: 40 km W Douentza (l \&, CAS), 158 km SW Gao ( 1 क, CAS), 180 km
 MS), 25 km E Hombon ( 48 , CAS), 30 km E Hombon ( $28, \mathrm{MS}$ ), 10 km S Mopt ( 34 \&, 10 of, CAS; 24 \&, 19 8, MS), 45 km W Mopti ( 2 \&. CAS; 3 \&. MS), 5 km S

San ( 158.188, CAS: $208,138, \mathrm{MS}$ ), 5 km E San ( 3 q. 18, CAS), 20 km S San (18. MS), 30 km NE San ( 18, CAS, $18, \mathrm{MS}$ ), 60 km NE $\operatorname{San}(48,28$, CAS; 3 \&, MS), 100 km NE San ( 4 \&, CAS; 3 8, $2 \mathrm{f}, \mathrm{MS}$ ), 20 km SW San ( 2 \&, 2 8, CAS; 6 \&, 19 8, MS), 40 km SW Ségou ( $28, \mathrm{CAS} ; 8$ 8, $38, \mathrm{MS}$ ), 70 km SE Ségou ( 2 \&. CAS), 40 km SW Sẻgou ( $119.4 \delta$, CAS), 80 km SW Ségou ( 1 है, MS).

PAKISTAN: Punjab: Chenab River bank 27 km SW Multan (I \&, CAS)


SALDI ARABIA: Haddad As Sham ( 1 \& BMINH)
SRI LANKA. Amparai District Panama, Radella Tank (19, BMNH, I \& I \& CAS; I \& , NMC: 48 including holotype, 1 \%, USNM). Hambantota District Palatupana Tank (I \& CAS, 2\&, USNMi), Monaragala District: Angunakolapelessa (1\&,1 $\%$ USNM). Trincomalee District Tennamaravadı(1\&, USNM), Amanvayal (1 \&, USNM).

## Gastrosericus waltlii Spinola

(Figures I42-144)
Gastrosericus W'alth Spinola, 1839:48I, \%. incorrect original capıtalıation. Lectotype: 8. Egypt (TORINO), designated by de Beaumont, 1952:49, not examined. - Dahlbom, 1845:467 (as Gasterosertcus), Kohl, 1885:409 (redescripıon), 4 I) (listed); André, 1888:223 (redescription); Dalla Torre, $1897: 695$ (listed); Mantero, $1915: 327$ (Lıbya); Ḱruger, $1929: 21$ (Lıbya); Nadıg, 1933:78 (Morocco): Honoré, 1942:53 (Egypt): Giner Mani, 1945:302 (Western Sahara); Gurg. 11a, 1932:478 (Libya), 1934:301 (listed, as walthi), 1940:293 (Libya), 1942:233 (Lıbya); de Beaumont, 1950:20 (Egypt), 1955:191, Bytunski-Salz, 1956:226 (Turkey); de Beaumont, 1956:203 (Libya). 1958:62 (Algena), 1960a:20 (Rhodes), 1960b:245 (Libya). Pulawskı, 1964:111 (Egypt), Myartseva, 1965:80 (Turkmenıstan), Pulawskı, $1965: 574$ (synonymy), de Beaumont, 1967:331 (Turkey), 1969:90 (Turkey), Osborn and Krombern. 1969:16 (Sudan); Kazenas, 1972 165; Myartseva, 1972:80, de Beaumont. Byınskı-Salz, and Pulawskı, 1973:16 (lsrael); Krombern. 1974:452 (Egypt), Bohart and Menke, 1976:231 (vertex illustrated), 253 (male head illustrated), 255 (wings illustrated), 256 (listed), 260 (female mandible illustrated), Kazenas, 1978:137 (ın key): Pulawski, 1982:364 (synonymy); Krombeın and Pulawski, 1986:18 (in revision of Sn Lankan species).
Denetus mger Dufour, 1853:378, 8. Holotype: ס, Algena: Pontèba, now Oumm ed Drou (MNHN), examıned. Neu synonym. - In Gastrosencus: Kohl, 1885:409 (as probable synonym of waltht, 411 (1isted); Dalla Torre, $1897: 695$ (listed) de Gaulle, 1908:121 (in catalog of French Hymenoptera); Bohart and Menke, 1976:256 (listed).
Gastrosericus Maracandicus Radoszkowsk1,1877:23, f, incorrect onginal capitahzation. Holotype: \&, Uzbekıstan: Samarkand (ZN1ML), examıned. Synonymozed with Gastrosericus walth by Pulaw'sk, 1965:574. - Kohl, 1885:410 (onginal descripuon copıed), 411 (histed); André, 1888:225 (tentatıvely synonymızed with wallhu): Dalla Torre, 1897:695 (listed); Gussakovskij. 1931:452; de Beaumont, 1947:396, Pittionı, 1950:25, Bytunskı-Salz, 1956:220; Georghou, 1977 : 190.-As Tachyes maracandica Magrettı, 1884:588 (Sudan).

Gasirosertcus rufiventres F. Morawitz, 1889:135,8. Holotspe: 8. China: Inner Mongolan Autonomous Region: Tsagan Buryuk (ZIN), examıned. Synonymized with Gastrosertous maracandicus by Gussakovski], 1931:452.- Dalla Torte, 1897:695 (listed). - As walt/n rutiventrls: Tsunck1, 1972:408 (new status)
Gastrosertus rufitarsis Cameron, 1902:286. "¢"", actually ó. Holotype: 8, India Guarat: Deesa (BMNH), examıned Synon mmed with Gastrosericus walth by Pulawskı, 1982:364.-Bohart and Menke, 1976:25n (listed)
Gastroserncus lanuginosus Arnold, 1921:117, ס. Lectotype: \&, Zımbabwe: Sawmills (SAMI), present designation, examined Synony mized with Gastrosericus walthit by Pulawski, 1982:364. - Arnold, 1929:383(8), 19.30:2 (listed), Bohart and Menke, 1976:250 (listed).
Gastrosericus maracandicus dubms Gussakovskı1, 1931:453, \&. Lectolype: ס: Turkmenistan: Komarovskiy near Askhabad (ZIN), designated and synonymized with Gastrosertcus walth by Pulawski in Kromben and Pulawski, 1986:18 examıned - As Gastroscricus waltu dubus: Bohart and Menke, 1976:256 (listed); Kazenas, $1978: 137$ (ın key)
Gastrosericus anmensis Giner Mari, 1945.375, \&. Holotype: \&, Morocco: Western Sahara La`youn (IEE), exanıned New synonyn-Giner Mari, 1945:362 (Western Sahara): Bohart and Menke, 1976:256 (1sted)

Lectotype Selection. - Arnold (1922) spoke of a single type of lanuginosus (with no further details), but he actually labeled a female and a male as types. The female is here selected as the lectotype of lanuginosus

Diagnosis. - Gastrosericus walttii has a shiny, triangular elevation on the propleuron (Fig. 143b), and long, sinuous setae

Figitri 143 Gastroncratz multh: a, genal setae ( $\times 48$ ), b, propleuron, obisque lateral view ( $~=51$ ): e, male sterna 111 and IV ( $~ 55$ )

on the head (Fig. 143a), thorax, scapal venter, and hindfemoral venter: setal length, adjacent to the oral fossa, is about equal to the basal mandibular width. The elypeus is all black or ferruginous apicomesally and the marginal cell is long (length of costal margin 1.5-2.6 $\times$ apical truncation, while-1.1-1.2 $\times$ in shestakovi). The female has a distinctive elypeus (Fig. 142a, b): the lateral margins of the lobe converge anterad and the foremargin is essentially truncate or nearly so; the gaster is all black or red basally and black apically (all red in most drewseni, black in some). The males of waltii and drewseni have a nonemarginate foretrochanter and a sharply pointed clypeal lobe (Fig. 142d). They can be separated only tentatively by color details (see drewsemi, p. 00). Their ranges are different: waltlii is widely distributed in Africa and Asia, whereas drewseni occurs between Libya and Jordan.

Description. - Mandible: posterior margin notehed, abduetor ridge absent. Labrum: free margin acutely emarginate. Orbit closer to hindocellar scar than to antennal socket. Vertex punctures larger than in capensis or guigliae. Propleuron near hindmargin with shiny, triangular elevation that is slightly raised posterad (Fig. 143a). Thorax densely punctate, punctures contiguous on mesopleuron. Scutal flange minimally expanded adjacent to tegula, contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin 1.5-2.6 $\times$ apical truncation. Recurrent veins separate or interstitial above.

Setae sinuous on thorax and adjacent to oral fossa where they are equal to basal width of mandible or longer; partly obscuring mesopleural integument: sinuous, semierect on scapal venter and hindfemoral venter.

Head and thorax black, mandible (except apex) pale yellow, propodeal dorsum reddish in a female from Ayvaj, Tajikistan. Wings hyaline.
8. - Mandible (Fig. 142c): inner margin with no subbasal teeth or cleft but with preapical tooth. Clypeus (Fig. 142a, b): disk without teeth or earinae; lateral margins of lobe convergent anterad, foremargin truncate or nearly so, roundly angulate laterally and with small, median projection that is absent in some specimens (the angles apparently do not correspond to lobe corners, which seem to be reduced); distance between eorners about $0.5 \times$ distance between comer and orbit. Distance between hindocellar scar and orbit about $0.9 \times$ scar length. Gena simple. Flagellomere 1: dorsal length 2.1-2.2 $\times$ apical widih. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 7 or 8 rake spines; length of apical spine 2.0-2.2 $\times$ apical width or basitarsus. Foretarsomere IV: length of inner apical spine $1.0-1.1 \times$ apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum 11 apicomesally with glabrous, triangular area. Pygidial plate covered with stout setae that almost totally obscure sculpture. Length 9-12 mm.

Gaster partly red (segments I and II or 1-111) in most specimens, but all black in females from the lvory Coast and Ghana. in some females from Egypt (all 1 f from Aswan, 58 from Cairo area, one from Fayed, all four from Luxor area, one from Sids, all six from Sinai Peninsula), and one each from Israel (Bnei Braq), Libya (Garian), Kenya (Archer's Post), Namibia (Rooipoort Farm), Senegal (Koumpentoum), and Tunisia (Djerba). Femora mostly black, but red in one specimen from Tunisia and one from Adzhigarm. Tajikistan. Tibiae and tarsi red in most specimens, but black in Sri Lankan individuals.
ô. - Mandible: inner margin without subbasal tooth. Clypeus (Fig. 142d): lobe acutely pointed, not angulate laterally, its free margin forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit about $0.9 \times$ sear length. Flagellomere 1: dorsal length $1.6-2.1 \times$ apical width. Foretrochanter not notched, but slightly constricted near base. Forebasitarsus with 4-6 rake spines; longest spine 1.5-1.8 $\times$ apical width of basitarsus. Dorsum of midbasitarsus with three preapical spines, dorsum of hindbasitarsus with two such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate setose. Sterna 111 and IV: see Variation below: sterna V and VI with usual, straight setae that delimit apical depression, and with shorter, dense, erect setae. Sternum V1ll rounded or roundly truncate apically. Volsella variable (Fig. 142f-i), and this variation not correlated with any external character. Length 6.29.0 mm

Gaster black, or basally red. Femora black. Tibiae varying: all black except narrowly yellow basally, brown red (Kenya, Zimbabwe), red except brown ventrally, or all red (Angola, some Egyptian males). Tarsi all red or darkened basally.

VAriation. - In the vast majority of males, sterna Ill and IV each have a mesal depression that is covered with very dense fimbriae: the fimbriae are appressed basally (fully concealing integument), curved ventrad apically, and contrast markedly with remaining sternal pilosity (Fig. 143c). These sterna have no depressions and are evenly setose throughout in all 32 males from Aswan, in the single male from Kom Ombo, and in one of the three males from Luxor area, that l collected in 1993. This striking difference, with no intermediates observed, seems to indicate that two species are involved. I could not, however, find any other morphological difference in support of this hypothesis, and the 11 females taken together with the males in Aswan do not differ from walthi in any noticeable way. 1 therefore conclude that the absence of sternal depressions and fimbriae in the male is a characteristic of Upper Egyptian populations of walthi.

Life History. - Gastrosericus waltli was common in several places along the west bank of the Nile in Aswan in April 1993. On 24 April, 1 collected a female sitting on a grass blade and holding, under her body, a paralyzed spider that Charles E. Griswold identified as Oxyopes sp. (Oxyopidae). This unusual prey contrasts with Honorés (1942) record of waltlii preying on gryllids.

Geographic Distribution (Fig. 144) - Africa south to Namibia and Zimbabwe (unknown from Congo River basin). Asia north to Turkey and adjacent Mediterranean islands, Armenia, and Kazakhstan, east to Mongolia and Sri Lanka.

[^12]Tyube. Turkmenistan (23 \&, 54 8, Zll; 1 \&, 1 ถ̂. ZMMU, b, r): Askhabad, BayramAli (Myartseva, 1965), Gassan Kulı, 15 km S Iskander, Kara Kala, Khodzha (12 km from Ghyaurs), Khodzha Kala (western Kopet Dagh), Komarovskiy near Askhabad, Krasnovodsk, Murgab, Repetek, Shassenem, Syunt Mountan (western K'opet Dagh). Tersakan near Kara Kala, Y'anty Kala on Chandyr River (western Kopet Dagh). Uzbekistan (1 \&, 2 8, CAS; 3 \&, 7 \%, ZIN; 1 ㅇ, 5 of, ZMMU; b, f): Bag Abzal, 50 km N Bukhara, Changhir, Karshı area, Kassan, Khıva-Nurlabay, Kuyu-Mazar, Nishan, Samarkand, Saraylaylik.

CצPRUS ( 9 \&, 7 I \&, b, r, BMNH, CAS, GRF, MZL, RMNH, USNM, ZIN): Akrotın Bay, Cherkes, Famagusta, Kalohorio, Lımassol, Monı, Y'ermasoyıa, Zak aki.
EGYPT (180 \% , 401 ס, b, r; AAM, BMNH, CAS, CGR, FSCA, JG, MS, MZL, NHMW, RMNH, UCD, USNM, ZMHU): Al Bahr al Ahmar: 25 km S Ain Sokhna. Al Fayyum: Karanis, Kom Osherm on Cairo-Fayum road. Lake Karun, Wadı Rayan (circa $40-80 \mathrm{~km}$ E Fayum cultivated area). AlJizah ( $=$ Ghiza); Abu Rawash, Ghiza Pyramids, Dahshur, Kerdasa, Maadı, Saqqara. Al Qahirah (= Carro): Carro, 11 km NW Carro, Gebel Asfar, Ezbet en Nakhl (spelled Ezb-Nahl). Helwan, Kafr Hakim, Katamia area 20 km E Maadı, Suez Road, Wadı Dıgla, Wadi Hof, Wadi el Tih. Al Bahr al Ahmar: Fayed, Wadi Hagul 30 km SW Suez. Aswan: Aswan (wes1 bank), Kom Ombo. As Sahra al Janubiah: Dakhla Oasis: Budhkula, $5-10 \mathrm{~km}$ E Tineida. As Sahra al Gharbiyah: Bahariya Oasis, Wadi an Natrun, Siwa oasis (the female from Baharein cited by de Beaumont 1950 b actually is pnepheros). Bani Suwayf ( = Bem Suef): $30-40 \mathrm{~km}$ SE El Wasta on road to Ras Zafarana, Sids. Girga: $\ddagger \mathrm{km}$ W Abydos. Luvor 3 km W Luxor near Medınet Habu temple. Qena: 85 km ENE Qena on road to Safaga. Sina (= Sinal): 10 km E El Arish, Nakhl, St. Catherine Monastery, Wadı Khreza cırca 45 km N Sharm el Sheikh, Wadi Feiran, Wadı Gharandal 30 km NW' Abu Zemıma, Wadı Malhaq 50 air km N Sharm el Sheıkh, Wadi Sudr 50 arr km SE Suez, Wadı Tayıba N Abu Zenıma.

GHANA: Legon, 12 km NNE Accra ( 8 \&, 12 b 8, CAS), Kawampe, $8^{\circ} 30^{\prime} \mathrm{N}$, $1^{\circ} 35^{\prime} \mathrm{W}, 45 \mathrm{~km}$ N Kintampo ( $1 \mathrm{o} \mathrm{b}, \mathrm{CAS}$ ).
GREECE: Rhodes Island (b): Isambika ( 1 ह, KMG), Ixıa ( 1 \&, 1 8, UCD; 5 \&, 2 of, RMNH). Kremastı ( 1 f, BMNH. 1 ㅇ, 1 of, GRF; 1 \&, MZL; 1 of, RMNH), Moni ( 1 \& , GRF).

INDIA: Gujarat: Deesa ( 15 \% r r BMNH, including holotype of rufitarsts). Karnataka: Bangalore ( 4 \&, 1 8, CAS). Maharashtra Matheran ( 28,1 f, BMNH). Rajasthan: Jaisamand Wildıfe Sanctuary 45 km SSE Udaıpur (I \&. CAS). Tamil Nadu: Combatore (2 8, GRF, CAS, b), Tranquebar ( 18, GRF).
IRAK: Bay! (1 of b, ZSBS).
IRAN: Azarbaijan: Ungyut Mugan: Altan (2 ob b, paralectotypes of dubius, ZIN). Fars: Daria Namak 27 km E Shiraz (I ob, CAS), Khuzestan Haft Tapeh, 300 km N Abadan ( 3 of $\mathrm{r}, \mathrm{CAS}$ ), Meshregeh ( $1 \& \mathrm{~b}, \mathrm{UCD}$ ). Teheran: 30 km S Teheran ( 3 of, b, CAS).

ISRAEL (de Beaumont. Bytinskı-Salz, and Pulawski, 1973 unless indicated otherwise): Arad (1 \& b, KMG), Bne Braq (1 \& , MZL), En Avdat. En Gedı (18, 2 of b, WS), En Quilt, Herzlyia, Jencho ( 1 \&, 18 b, MZL; 1 of b KMG), Mezada ( 1 of, 4 क $\mathrm{b}, \mathrm{r}, \mathrm{WS}$ ), Mikhmoret ( 2 ह $\mathrm{b}, \mathrm{QA}$ ), Nuserrat ( 18,3 \& b, QA), Ramat Gan ( 1 \& b, RMNH), Sichron Y'aqqov, $\operatorname{Tel} \operatorname{Aviv}(2 \& b, R M N H)$, Tibenas ( 1 \& b, MZL), Wadi Ruth near Nizzana

IVORY COAST: 40 km S Toumod, ( $38,58 \mathrm{~b}, \mathrm{AAM} ; 88,248 \mathrm{~b}, \mathrm{CAS}$ ).
JORDAN: Dhot Ras, $31^{\circ} 00^{\prime} \mathrm{N}, 35^{\circ} 46^{\prime} \mathrm{E}(1$ i b, RMNH), 5 km S El Azraq, which is $31^{\circ} 50^{\prime} \mathrm{N}, 36^{\circ} 47^{\prime} \mathrm{E}$ ( 1 ह $\mathrm{b}, \mathrm{RMNH}$ ), Wadı Walia ( 1 of $\mathrm{b}, \mathrm{AAM}$ ).

KENY'A: Archer's Post on Ewaso Ng'm River (2 \&, CAS), 10 ml N Laısamis (1) ㅇ, 1 if r, CAS), Rıfi Valley, Olorgasallie (1 \& b, CAS), Tana Rıver (1 \&, BMNH), Tsavo National Park: Kıtani Lodge (1 \& b, CAS).

LIBYA: Cyrenaica: Gialo (Guglia, 1932), Giarabub = Jaghbub (Kiruger, 1929). Tripolitania: Bungerm (Mantero, 1915), El-Hag (Guiglia, 1940), Garian (18, MZL). Gargaresc $=$ Qarqansh $(1$ of $b, M Z L)$ Leptıs Magna $=$ Labdah ( 1 o, BMNH $)$, Tauorga $=$ Tauurgha (de Beaumont. 1960b), Tagsura $=$ Tajura ( $28, \mathrm{BMNH}$ ). MALAWI: Grand Beach, $13^{\circ} 43^{\prime} \mathrm{S}, 34^{\circ} 38^{\prime} \mathrm{E}$ (I $\mathrm{o}^{\circ}$. SAM).
MALI: Anevis $=$ Anefis ( $18,1 \mathrm{\delta}, \mathrm{KMG}), 30 \mathrm{~km}$ S Ansongo (1 of b. KMG).
MONGOLIA: Bayanhengor Aymag: oasis Ehingol (Tsunek1, 1972). Toy Aymag: Dzuunmod (18. ZIN).

MOROCCO: Agadır (3 \&, 5 s b, MZL), Aïl Saoun, $30^{\circ} 45^{\prime} \mathrm{N}, 6^{\circ} 37^{\prime} \mathrm{W}(48,22$ \% b, WS), Asni ( 2 i b, BMNH, MZL), Boumaine ( 1 \&, MS), Ketama ( 1 \& b, MT), Ǩsar es Souk (1 of b, MZL), La`youn in Western Sahara (as El Aıun, 1 ㅇ, 3 of b, IEE, including holotype of alunensts), Marrakech ( 1 ㅇ, CAS; 2 9,5 \% $\mathrm{b}, \mathrm{MZL} ; 1$ of b, RMNH), Mıdelt ( 1 b b, JG), 20 km NW Midelı (1 of b, CAS; $2 \delta \mathrm{~b}, \mathrm{MS}$ ), Rabat ( 3 of, UCD), 34 km SE Safi ( 1 of b, MS), Tıznit: Oued Massa ( 1 \&. CAS; 1 ㅇ, KMG; 1 \&, 98 b, MZL); Taroudannt, Oued Souss ( 18, KMG).

NAMIBIA: Damaraland: Rooipoort Farm at Ugab River ( 1 \&, ZMK). Grootfontein District: 60 km SW Otavı ( 1 है, MS). Mariental District: Mariental ( 58 b , AMG), 5 km N Mariental (1 of b. CAS). Omaruru District: Omaruru (18, SMNW).

Rehoboth District 9 km S Rehoboth ( $18,3 \mathrm{f}$ b, CAS; 1 of b, MS). Outjo District: 31 km SE Kamanjab ( 1 ס, CAS).

OMAN: Behla (1 \&, KMG), Rostaq (1 \& b, KMG), Salalah ( 1 ob b, BMNH), Wattayah, $23^{\circ} 36^{\prime} \mathrm{N}, 58^{\circ} 30^{\prime} \mathrm{E}$ (I \&, PMA).

PAKISTAN: Baluchistan: Quetta ( 4 \&, 2 of 5, BMNH, 1 \&. USNM), Kharan (1 of b, KMG). Punjab: Fassalabad ( 1 \&, Washington State University). Sind: Malir River bed 5 km ESE Karachi International Airport (3 ह b, CAS).

QATAR: Al Sinnah ( 1 fo, KMG).
SAUDI ARABIA: Abu Ansh ( 1 \& b, KMG), Ad Diriyah (1 \&, KMB), El Riyadh ( 18.3 o b, r, CAS: 2 क, 2 o, WL), Jeddah ( 3 of b, BMNH) .

SENEGAL: Bayakh 48 km E Dakar ( 1 9, CAS), Dagana (18, AAM), Koumpentoum ( 18 , UCD), Ndangane 45 km SE Mbour ( $18 \mathrm{~b}, \mathrm{FB}$ ), $25-35 \mathrm{~km}$ S Richard Toll ( 1 of, 1 of b, ZMA) , 3 km NWE Samba Dia $=70$ air km W Kaolack ( 1 of b, CAS).
SRI LANKA: Mannar District: Ma Villu( $1 \mathrm{\delta}, \mathrm{~b}$, USNM), 0.5 mi NE Kokmotte in Wilpattu National Park ( 18,1 of b, CAS: 48,28 of b , USNM). Trincomalee District: Temnamaravadı (2 of $b$, USNM)

SUDAN: Karkur Murr in Gebel 'Uwenat at juncture of Sudan, Egypt and Libya (1 of $\mathrm{b}, \mathrm{CAS}, 2$ क. 2 of b , USNM), Khartum ( 2 o $\mathrm{b}, \mathrm{KMG}, \mathrm{ZMA}$ ).
SYRIA: Mezzé near Damascus ( 1 8, b, MZL).
TANZANIA: Manyara (I \&, AAM).
TUNISIA: Carthage ( 1 of $\mathrm{b}, \mathrm{MT}$ ), Djerba Island ( 1 \&, MZL), Gafsa ( 1 ob b, MT), Haffouz ( 1 \& b, MT), Kalaa Shrira $35^{\circ} 49^{\prime} \mathrm{N}, 10^{\circ} 3 \mathrm{~A}^{\prime} \mathrm{E}(1$ है b, MT), Saidane in Kebili area (28, KMG), Tozeur (18, JG), Tunis (1 \% b, MT).

TURKEY: Hakkari: S Beytüssebab (KS). Mersin: Mut (18, 1 b, MS). Urfa. Hakfetı (l o b, MS), Urfa (1 ơ b, MS). Also: Tuz Gölü (Bytmski-Salz. 1956).

UNITED ARAB EMIRATES: Duba1 ( 1 \& b, UCD), Sir Abu Nu'air, $25^{\circ} 10^{\prime} \mathrm{N}$, $54^{\circ} 15^{\prime} \mathrm{E}$ (2 of b, BMNH, 1 \&. USNM).

YEMEN: Aden: Khormaksar (2 of, BMNH), Aden: Mohur (18, AAM), Hays circa 50 km S Hodeıdah ( 3 ob b, AAM, 18 b CAS), Hoderdah ( $18 . \mathrm{KMG}$ ).

ZIMBABWE (b): Khami ( 1 o, SAM). Ummatı Valley ( 1 o, SAMC). Sawmills (2 \%, AMG; 2 of, BMNH; 1 o. FSAG; 1 o b, MRAC; 1 o, NHMW; 1 \& lectotype, 2 of paralectotypes, SAM, 18, ZMHU).

## Gastrosericus wroughtoni Cameron

(Figures 145-147)
Gastrosericus Hroughom Cameron, 1889:147, sex not indicated, incorrect original capitalization. Holotype: 8, India: Maharashtra: Pune (BMNH), examined. - Bingham, 1897:217 (redescnption); Dalla Torre, 1897:696 (1sted); Cameron. 1902:287 (m key); Bohart and Menke. 1976:256 (listed).

DIAGNOSIS. - The female of wroughtoni can be recognized by the shape of the mandible, with its unusually broad cleft (Fig. 145b); a deep postocellar impression; and also by the following combination of characters: pygidial plate with stout setae on apical portion (Fig. 145d), clypeus with well-defined and undivided lobe and without teeth or carinae on surface (Fig. 145a), venter of apical tarsomeres basally with two or three spines on the midline (Fig. 145c). The large body size ( $8.5-10.5 \mathrm{~mm}$ ) is a subsidiary recognition feature.
The male shares with sanctus the combination of short genal setae (markedly shorter than basal mandibular width) and fimbriate impressions on sterna III and IV. Unlike sanctus, wroughtoni has a deep postocellar impression, the clypeus is black laterally, the clypeal lobe is narrower, with less prominent corners (Fig. 145e), the sternal fimbriae are dark, and the body length is $6.8-9.0 \mathrm{~mm}$. In sanctus, the postocellar impression is shallow, the clypeus is all yellow, the clypeal lobe is wider, with more prominent corners (Fig. 102d), the sternal fimbriae are pale, and the body length is $5.5-6.0 \mathrm{~mm}$.

Description. - Mandible: posterior margin notched, abductor ridge absent. Labrum: free margin broadly emarginate. Orbit closer to hindocellar scar than to antennal socket. Propleuron near hindmargin with transverse carina that is evanescent lalerally and raised admedially. Mesothorax with well-defined punctures. Scutal flange evenly curved throughoul. Marginal

 of lemale (. 78) ; e, male clypeus ( $\times$ ) if, volsella (* 172).


Figurf 146. (iastronericus uroughfon make loretrochanter ( 129 ).
cell: length of costal margin 2.9-3.8 $\times$ apical truncation. Recurrent veins separate in most specimens, interstitial above in some.

Setae suberect to nearly appressed adjacent to oral fossa, 0.2$0.3 \times$ basal mandibular width; scutal setae appressed; mesopleural setae partly concealing integument: propodeal setae suberect to subappressed between side and hindface.

Head black; mandible yellow basally and black apically, largely reddish in some specimens; clypeal middle section yellow in most specimens; scapal venter yellow in many specimens. Thorax black, pronotal lobe narrowly yellow posteriorly. Gastral segments 1 , or 1 and 11, red, remainder black. Femora black. Tibiae black except yellow dorsally (yellow present only basodorsally in most specimens, vestigial in some, but extending to tibial apex in others): foretibia largely reddish. Tarsi all black or reddish apically. Wings slightly infumate.

ㅇ.-Mandible (Fig. 145b): inner margin with large subbasal tooth but without preapical tooth: cleft expanded into decp. broad emargination. Clypeus (Fig. 145a): disk without teeth or


Figuri 147. Collecting localities of Gusirosermus wroughtom
carinae; free margin of lobe sinuate, corner well-defined; distance between corners $1.6-2.0 \times$ distance between corner and orbit. Flagellomere I: dorsal length 1.7-2.0 $\times$ apical width. Distance between hindocellar scar and orbit about $0.6 \times$ scar length. Gena simple. Pronotum: precollar not carinate laterally, side not sulcate. Forecoxa simple. Forebasitarsus with 5 or 6 rake spines; length of preapical spine $2.0 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine about $0.8 \times$ apical width of tarsomere (Fig. 145c). Venter of tarsomere V with two or three spines on midline of basal half. Sternum Il apicomesally with glabrous, triangular area. Setae of pygidial plate inconspicuous anteriorly but stout on apical third or so, almost totally concealing integument (Fig. 145d). Length 8.510.5 mm .
8. - Mandible: inner margin with conspicuous subbasal tooth.

Clypeus (Fig. 145e): free margin of lobe sinuate (arcuate in some specimens), angulate laterally; distance between corners $1.0-1.3$ $x$ distance between corner and orbit. Distance between hindocellar scar and orbit about $0.6 \times$ scar length. Flagellomere 1: dorsal length 1.4-1.5 $\times$ apical width. Foretrochanteral notch shorter than distance that separates it from 1rochanteral apex (Fig. 146); its bottom broad, with longitudinal row of setae. Forebasitarsus with 2-4 rake spines; longest spine 1.6-1.8 $\times$ apical width of basitarsus. Dorsum of mid- and hindbasitarsus with one or two preapical spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setose. Sterna III, IV (except laterally) with fimbriate depressions, fimbriae appressed basally and fully concealing integument, curved ventrad apically. Sternum VIII rounded apically. Volsella: Fig. 145 f. Length $7.8-9.8 \mathrm{~mm}$.


Figure 148. Gastrosericus xanthoph/us: a, female head frontally ( $\times 30$ ); b, female clypeus ( $\times 54$ ) ; $c$ and $d$, outhnes of female clypeus showing individual variation ( $\times 56$ and 53 , respecuvely); e, female mandible ( $\times 60$ ); female head laterally ( $\times 35$ ) ; $g$, outline of female head showing individual vanation in the tooth size ( $\times 37$ ); h. male head $(\times 43$ ); 1, male clypeus ( $\times 85$ ), J, outline of male clypeus showing individual variation ( $\times 88$ ); $k$, volsella ( $\times 255$ ).

Geographic Distribution (Fig. 147). - Pakistan to Sri Lanka.

Records.-INDIA: Maharashtra: Krishnagırı Upavan Natıonal Park 12 air
 Pune ( $18, \mathrm{BMNH}$, holotype). Rajasthan: Jaisamand Wildlıfe Sanctuary, 45 km SSE Lidaıpur ( 16 8. CAS), Mount Abu ( 4 万, CAS), Udaıpur ( 3 8. CAS). Tamil vadu Thanjavur ( 1 o. USNM).

PAKISTAN: Punjab: Multan (18, CAS). Sind $40-45 \mathrm{~km}$ E Karachı on Karachı-

Tatta road (I $\delta, \mathrm{CAS}$ ), Kırthar National Park 150 km NE Karachı, $25^{\circ} 10^{\prime}-26^{\circ} 05^{\prime} \mathrm{N}$, $67^{\circ} 10^{\circ}-67^{\circ} 55^{\prime} \mathrm{E}$ ( 5 d. CAS).
SRI LANKA: Mannar District: Ma Villu (I \&, USNM).

Gastrosericus xanthophilus sp.n.
(Figures 148-150)
Derivation of Name. - Xanthophilus derives from two Greek


Figure 149. Gastrosericus xanthophius: a, male foretrochanter ( $\times 257$ ); b, bottom of foretrochanteral notch ( $\times 514$ ).
words, xanthos, yellow, and philos, a friend; with reference to the yellow markings in this species.

Diagnosis. - The female of ranthophihus can be recognized by the yellow pygidial plate combined with a prominent corner of the clypeal lobe (Fig. 148a-d). Subsidiary recognition features are: gena with one or two teeth (Fig. 148f, g), pronotal side sulcate, mesopleural integument hidden by vestiture, and forecoxal venter concave.

In the male, the clypeus is all yellow, with an acutely to obtusely pointed lobe (Fig. 148h-j), and gastral terga have yellow markings. Gastrosericus braunsi is similar, but in xanthophilus the forecoxal venter is very shallowly concave (except slightly swollen along the foremargin) and the flagellum of most specimens is partly yellow or yellow brown. In braunsi, the forecoxal venter is flat or minimally convex, and the flagellum is black.

Description.-Mandible with notched posterior margin, abductor ridge absent. Labrum: free margin with triangular emargination. Orbit insignificantly closer to hindocellus than to antennal socket in female, reverse in male. Propleuron simple. Thorax finely sculptured, scutum and mesopleuron with illdefined punctures. Scutal flange evenly curved throughout. Marginal cell: length of costal margin $3.0-5.5 \times$ apical truncation. Recurrent veins separate, interstitial above (most specimens) or confluent in a short petiole.

Vestiture appressed on head and thorax, including setae adjacent to oral fossa and those between propodeal side and hindface; mesopleural setae largely or entirely obscuring integument.

Head and thorax black but the following are pale yellow: mandible (except apically), clypeus, part of antenna (see below), pronotal lobe, tegula, and humeral plate. Wings hyaline.
9.-Mandible (Fig. 148e): inner margin with basal tooth and broad, shallow cleft, but with no preapical tooth. Clypeus (Fig. 148a-d): disk of most specimens raised along midline, all flat in small specimens, raised area in largest specimens expanded mesally into laterally compressed tooth; free margin of lobe varying: shallowly emarginate mesally, or nearly straight, or with obtuse, median projection; corner conspicuously projecting; distance between corners about $1.5 \times$ distance between
corner and orbit. Distance between hindocellar scar and orbit about $1.3 \times$ scar length. Gena, above mandibular base, with subvertical carina which is expanded into a tooth toward dorsal end, also toward ventral end in many specimens (Fig. 148f, g); ventral tooth smaller. Flagellomere I: dorsal length $1.4 \times$ apical width. Pronotum: precollar carinate laterally (carina vestigial in some specimens), side sulcate. Entire forecoxal venter concave, foremargin carinate, conspicuously expanded in some individuals. Forebasitarsus with 4-6 rake spines; length of apical spine about 1.1-1.4 $\times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine $0.4-0.5 \times$ apical width of tarsomere. Venter of tarsomere V without preapical spines. Sternum II asetose apicomesally. Pygidial plate with large punctures and microscopic, sparse setae and also a few stout setae apically. Length $5.4-7.3 \mathrm{~mm}$.

Scape pale yellow except black basodorsally, flagellum dark brown dorsally, yellowish brown ventrally. Femora black basally, reddish mesally, with yellow spot apically (spot longer ventrally than dorsally). Tibiae reddish, yellow dorsally, tarsi reddish. Gaster red, terga with pale yellow preapical fasciae (terga l-V fasciate in some specimens, only tergum V in others, and intermediates occur); pygidial plate yellow.

ס.-Mandible: inner margin without subbasal tooth. Clypeus (Fig. 148h-j): free margin of lobe pointed mesally in most specimens (roundly pointed in one male collected 50 km SW of Usakos), forming single curved line with rest of clypeal margin. Distance between hindocellar scar and orbit $1.5 \times$ scar length. Flagellomere I: dorsal length $0.8-1.0 \times$ apical width. Forecoxal venter somewhat swollen along foremargin, remaining surface very shallowly concave. Foretrochanteral notch variable, about as long as distance that separates it from trochanteral apex or markedly longer (Fig. 149a); its bottom with a row of erect setae (Fig. 149a, b). Forebasitarsus with 2 or 3 rake spines; longest spine not exceeding apical width of basitarsus. Dorsum of midbasitarsus at most with one preapical spine, dorsum of hindbasitarsus without such spines. Inner claws of all tarsi as large as outer claws. Pygidial plate densely punctate and setosc. Sterna without median depressions, minutely, closely punctate through-

out; sternal setae short, uniform. Apex of sternum VIII roundly truncate or insignificantly emarginate. Volsella: Fig. 148k. Length $3.8-5.5 \mathrm{~mm}$.

Antenna: scape pale yellow except black basodorsally; flagellum in most specimens yellow except darkened dorsally, but all black in a male from Okahandja area. Femora largely yellow, darkened basally (largely black in Okahandja specimen). Tibiae and tarsi yellow. Gaster red or terga III-VII and all sterna darkened, terga with pale yellow preapical band which may be broad or narrow (bands narrow, inconspicuous, in a male from Okahandja District); terga VI and VII all yellow in some specimens.

Geographic Distribution (Fig. 150). - Namibia and western South Africa.

Records. - Holotype: \&, NAMIB1A Karibib District 65 km SW Usakos, 24 Feb 1990, WJP (CAS) Paratypes NAMIBIA. Damaraland Ohombahe area 33 km W Llıs Mıne, 6 Feb 1974, M E. Irwin (I ס. UCD) Karibib District: Kambıb, 7 Feb 1993, MS ( 3 f. MS); 20 km N Karibib, 10 Feb 1993, MS ( $18, \mathrm{MS}$ ), 15 km W Kanbib, 26 Feb 1990, MS (4 8, MS), WJP (49, 2b, CAS), 17 km W Usahos, 21 Feb $1990, \mathrm{MS}(3$ ㅇ. 3 万. MS), WJP (2 8, CAS), 50 hm SW Usakos, 21 Feb 1990. 28.3 3. MS), WJP (I 8, 4 s.CAS), 55 km SW Usakos, 25 Feb 1990, MS 19 ¢. MS), WJP (29.1 8, CAS), 65 km SW Usakos, 24 Feb 1990, MS (148. II $\delta$, MS), WJP (98, 7 f, CAS), 1 Mar 1990, MS (3\&, 3 8, CAS; 278,15 8, MS), WJP

 female forecona in profile ( $\cdot 47$; e, male clypeus ( $\cdot 81$ ).
(18, 1 \&, BMNH; 10 \&, 5 §, CAS). Okahandja District. 27 km S Okahandja, WJP ( 18,4 B, CAS).
SOUTH AFRICA: Cape Province: Nuweputs Farm 13.5 mi SSW Springbok, 7 Sep 1972, M. E. and B. J. Irwin, (1 \%. UCD), 16 km S Vioolsdrf, 29 Nov and 2 Dec 1974, J G. and B. L. Rozen ( 3 d, AMNH, 1 d, CAS).

Gastrosericus zoyphion sp. n.
(Figures 150.151).
Derivation of Name. - Zoyphion, Greek diminutive of zoon. animal.

DIAGNOSIS. - Gastrosericus zoyphion and madecassus are the only two members of the genus found in Madagascar. Unlike other Gastrosericus, females of the two species have a basally arcuate posterior mandibular margin (Fig. 69c). The female of zoyphion, however, is unique in having a rounded median clypeal prominence (Fig. 151a) and two forecoxal teeth (Fig. 151d). A conspicuous, winged-like propleural projection (as in Fig. 70a) is shared with females of madecassus and swalei (a similar but shorter process is also present in synander and occasional funereus).

The male of zoyphion is very similar to that on madecassus and shares all its basic structures (see madecassus, p. 85). They differ only in the shape of the clypeal lobe, which is somewhat irregularly rounded in zoyphion (Fig. 151e) while obtusely tridentate in madecassus (Fig. 691).

Description. - Mandible: posterior margin stepped in female, notched in male, abductor ridge absent. Labrum: free margin broadly, shallowly emarginate. Orbit markedly closer to hindocellar scar than to antennal socket in female, slightly so
to equidistant in male. Propleuron with conical tubercle near hindmargin (tubercle evanescent in male). Thoracic sculpture fine, scutal punctures inconspicuous. Scutal flange evenly arcuate except contrastingly concave near scutal hindcorner. Marginal cell: length of foremargin $4.3-6.0 \times$ apical truncation. Recurrent veins interstitial or confluent into short petiole.

Vestiture short, appressed (including those adjacent to oral fossa and on propodeum).

Head and thorax black but the following are pale yellow: mandible (except apically), clypeus along free margin, pronotal lobe, tegula (except basally), and humeral plate. Gaster red. Fore- and midfemora black, hindfemur largely red in female. black in male. Foretibia brown on inner surface, pale yellow on outer surface, black on posterior surface; mid- and hindtibiae black or red, pale yellow dorsally. Tarsi brown, male basitarsi pale yellow. Wings almost hyaline.
9.-Mandible (Fig. 151 c ): inner margin without subbasal or preapical teeth, with broad, shallow concavity probably derived from cleft; condylar ridge roundly arcuate near base, obtusely angulate apically (as in Fig. 69e). Clypeus (Fig. 150a): disk without teeth or carinae; free margin of lobe produced mesally into a round projection (deeply emarginate on each side of projection in one specimen studied); distance between corners 4.8-5.0 $\times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $0.8 \times$ scar length. Gena simple. Flagellomere I: dorsal length $2.1-2.3 \times$ apical width. Pronotum: precollar carinate laterally, side sulcate. Propleuron with long, large apicolateral projection (as in Figs. 69g; 70a). Forecoxa shallowly concave along admedian margin (except apically), delimited an-


Figure 152. Gushosethers zin: a. male clypeus ( 30). b. volsella ( $=$ bl), c, penis valve ( $\times 59$ )
teriorly by a prominent, triangular expansion, and by a similar although smaller expansion laterally (Fig. I51c). Forebasitarsus with 5 rake spines; length of apical spine $1.4-1.6 \times$ apical width of basitarsus. Foretarsomere IV: length of inner apical spine $0.3-0.5 \times$ apical width of tarsomere. Venter of tarsomere $V$ without preapical spines. Sternum Il apicomesally with glabrous, triangular area. Pygidial plate sparsely punctate, asetose except for two stout, apical setae. Length $6.5-7.0 \mathrm{~mm}$.
o.-Mandible: inner margin with no subbasal tooth. Clypeus (Fig. 151 d ): free margin of lobe forming single curved line with rest of elypeal margin. Distance between hindocellar scar and orbit about $0.8 \times$ scar length. Flagellomere I: dorsal length 1.3$1.5 \times$ apical width. Foretrochanteral notch shallow, slightly shorter than distance that separates it from trochanteral apex, margined anteriorly by row of erect setae (see Fig. 70c). Forebasitarsus with 3 rake spines; longest spine minimally longer than apical width of basitarsus. Dorsum of mid- and hindbasItarsus with 1 or 2 preapical spines each. Inner claws of all tarsi as large as outer claws or minimally smaller. Pygidial plate setose. Sterna not depressed mesally; sterna Ill-VI: punctures larger and setae longer than those of sternum 11 (setae not concealing integument). Sternum VIII emergent apically. Volsella as is madecassus (see Fig. 69j). Length $5.0-5.5 \mathrm{~mm}$.

Geographic Distribution (Fig. 150). - Known only from the type locality in Madagascar.

[^13]Gastrosericus zyx sp. n.
(Figures 150, 152)
Derivation of Name. - Z2N an arbitrary combination of letters.

Diagnosis. - The male of zl: has a unique clypeus (Fig. 152a): the lobe free margin is broadly sinuate, and the corners are
prominent. Subsidiary recognition features are: scape and tarsi black, and occipital carina joining hypostomal carina. The female is unknown.

Description (based on male only).-Mandible with notched posterior margin, abductor ridge absent. Labrum: free margin broadly emarginate. Orbit slightly closer to postocellar scar than to antennal socket. Propleuron simple. Thorax finely sculptured, but individual punctures discernible on scutum. Scutal flange slightly expanded adjacent to tegula. contrastingly concave between expansion and hindcorner. Marginal cell: length of costal margin $4.0-4.6 \times$ apical truncation. Recurrent veins interstitial above.

Setae appressed on vertex and adjacent to oral fossa; appressed, largely obscuring mesopleural integument; suberect between propodeal side and hindface.

Head, thorax, gaster, and femora black, but the following are pale yellow: basal half of mandible, pronotal lobe, and tegula anteriorly. Tibiae pale yellow dorsally. Tarsi black.
9.-Unknown.
ô. - Mandible: inner margin with subbasal tooth. Clypeus (Fig. 152a): free margin ol lobe sinuate, conspicuously angulate laterally; distance between corners about $1.6 \times$ distance between corner and orbit. Distance between hindocellar scar and orbit about $1.2 \times$ scar length. Flagellomere 1: dorsal length about 1.1 $x$ apical width. Foretrochanteral notch longer than distance that separates it from trochanteral apex, its bottom glabrous. Forebasitarsus with 4 rake spines; longest spine equal to apical width of basitarsus. Mid- and hindbasitarsus dorsally with no preapical spines. Pygidial plate densely punctate and setose. Sterna without mesal depressions, minutely, closely punctate throughout; sternal setae short, uniform. Sternum VIII rounded apically. Volsella: Fig. 152b. Length 5.1-5.4 mm.

Geographic Distribution. - Known from two localities in eastern Zambia.

Records. - Holotype: 8, ZAMBIA 42 km SW Petauke, $14^{\circ} 30^{\prime} \mathrm{S}, 31^{\circ} 02^{\prime}$ E. 16 Mar 1995 WJP(CAS). Paralype: ZAMBIA. $6-18 \mathrm{~km}$ SW Nlfuwe. $13^{\circ} 07^{\circ} \mathrm{S}, 31^{\circ} 45^{\prime} \mathrm{E}$, 20-22 Mar 1995 WJP (1 f. CAS)

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*I record with deep sorrow the passing of Alessandro Mocks, a dedicated wasp collector, charming person, and dear friend, who died 6 Apnil 1995 a1 the age of 75 in a Lusaka hospital, toward the end of our expeditson to Zambia.

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| meisus $\mathrm{sp} . \mathrm{n}$. | 68 | truncatus sp. n . | 144 |
| karooensis Brauns, 1906 | 71 | tuberculatus sp. n | 146 |
| lamellatus Tumer, 1912 | 74 | turnert Arnold, 1922 | 150 |
| lanuginosus Arnold, 1922 | 160 | unicolor Arnold, 1929 | 151 |
| latuceps Amold, 1922 | 35 | redda Pulawskı, 1986 | 154 |
| lepudus sp. n . | 81 | wallht Spinola, 1839 | 160 |
| lucidus sp. n . | 81 | wroughtont Cameron. 1889 | 163 |
| madecassus (Kohl, 1907) | 85 | xanthophlus sp. $\mathbf{n}$. | 166 |
| maracandicus Rados2kowskı, 1877 | 160 | zolphon sp. n . | 169 |
| marginalıs GussakovskıJ, 1931 | 88 | zw sp.n. | 170 |


[^0]:    

[^1]:    

[^2]:    Iferire 30 (iastroserman dentutus, female d. dypeus (. 67), b. mandible $(x$ 77)

[^3]:    Records.-EGYPT: Al Bahral Ahmar $35-45 \mathrm{~km}$ E Qattana $=18-25 \mathrm{~km} \mathrm{NE}$ An Sukhna on Ain Sukhna-Maadı road (18,2 8, AAM1), Wadı Hagul 30 km SW Suez (28,48, AAM; 1 f, CAS). Allshandariyah( = Alexandra) Agamı, 31009'N, $29^{\circ} 47^{\prime} \mathrm{E}(38.2$ B, AAM, 2 9, (AS), near Alexandna (2 \%, MZL), Amrye (de Beaumont, 1466). Ikingı Mariout circa 30 km W Alexandria (2 8. 78 . AAM), Al

[^4]:    Records. - BURKINA FASO: Gourma Kompienga 20 km S Pama ( 1 is, 1 of, CAS; 38, 2 ǒ, LEM).

    MALl. 25 km N Bamako (2 $9, \mathrm{CAS}$ ), 30 km N Bamako (58, 1 f. CAS; 4 \&. 1 o, MS), Tillembeya on Niger River, apprommately $14^{\circ} \mathrm{N}, 4^{\circ} \mathrm{W}(4$ \&, 1 है, BMNH, lectolype 9 and paralectotypes).

[^5]:    Records. - CHINA: Inner Mongolian Autonomous Region: Het-Ch'eng ( = Hara

[^6]:    Gastrosericus pratensis Arnold
    (Figures 89-91)
    (iastrosericus pratensts Amold, 1929.382. 9. Holotype: ․ Zimbabwe: Bulawayo (SAM). examined - Amold. 1930:2 (listed), Bohart and Menke, 1976:256 (hs1ed).

[^7]:    Records. - Holotype: IVORY COAST: 56 km N Niakaramandougou, 11 Jan 1991, WJP (1 8, CAS). Paratypes: GHANA: Accra, 27 Jan 1991, WJP (18, CAS)
    SENEGAL: Ferlo, Feté-olé, 6 Oct 1976, GC (1 oै, UCD).
    TOGO: 5 km W Sokodé, 17 and 20 Feb 1991. WJP ( 38.5 5. CAS)

[^8]:    Records - COMMONWEALTH OF INDEPENDENT STATES: Turkmenistan Uch-Adzhl (2 3 , including hololype of shestaken, ZIN). U'zbehistan AkTyube on lower course of Surkhan River (1 © CAS).

    PAKISTAN: Karachı ( 1 古, BMNH).

[^9]:    
    

[^10]:    Records. - INDIA: Tamil Nadu. Tulticorin (2 \&, BNNH, CAS),
    SRI LANKA: Amparai District Panama, Radella Tank (1 \&, CAS; I \&, USNM), Colombo District: Pamunugama ( 18, CAS, 28, USNM), Hambantota District: Bundala Sanctuary, Circuit Bungalow ( 18 , USNM), Palatupana WLNPS Bungalow ( 6 \&, BMNH, 1 \&, CAS: 1 \&, NMC, 2 \&, USNM), Palatupana Tank (I \&, USNM), Yala, Palatupana Tank (18. USNM). Mannar District: 0.5 m 1 NE Kokmot1e in Wilpattu Natıonal Park ( 1 \&. CAS; 1 \&. USNM), Kondachchı, Maha (I \&, NMC), Kondachehı, Ma Villu (28, USNM). Manchchukkadı (18, CAS, 2 9, NMC: 1 \&

[^11]:    Records-GHANA. Kawampe, $8^{\circ} 30^{\prime} \mathrm{N}, 1^{\circ} 35^{\prime} \mathrm{W}, 45 \mathrm{~km}$ N K゙intampo ( 18,

[^12]:    Records. - (b gaster all blach, r: gaster red basally): ALGERIA: Biskra ( 3 \& b , M2L). Therir in Tassilı des Ajger (de Beaumont. 1958), Ghazaouet (1 ob b, MZL). Oumni ed Drou (18, holotype of Dinetus miger).

    ANGOLA. R. Giraul 10 ml NE Nambe ( 2 \& b. BMNH).
    CHAD Ennen Kudi (I \& BMNH)
    CHINA Inner Mongolian Autonomous Region Tsagan Buryuk near Tsagan Tohor, $41^{\circ} 00^{\circ} \mathrm{N}, 100^{\circ} 00^{\prime} \mathrm{E}$ (1 \& , holotype of mhentris, ZIN).

    COMMONWEALTH OF INDEPENDENT STATES: Armenia Yerevan (1 3 b. ZMMU) Karakhstan Chulı (as Dzhulek, 18, Z1N) 50 km N Furmanovha in Dzhambul Oblast (1 ठ r, CAS), It N Alma Ata (Kazenas, 1972), Kapchagay N Alma Ata (18, 1 \&b, USNM). Panfilov (1 \&r, CAS). Mangyshlak Peninsula: Koylus (1 \& r. CAS). urochushche Buzdak (1 \% r. CAS). Tajikistan (28. CAS, 10 \&. 23 8. Z1N, 108.5 3, ZANTU; b, r), Adzhrgam (upper Amu Darya), Ayvaj, Baumanabad ( = Saraykamar) on Pyandzh Rıver. Dushanbe, Dzhılıkul, Koy-pyaz-lau. Kurgan

[^13]:    Records - Holotype: 8. MADAGASCAR 5 km N Taller, 22-23 Mar 1994, W.JP (CAS). Paratypes: same locality as holotype ( 10 , 28, CAS).

